DOCUMENT RESUME

ED 247 118 SE 044 714

AUTHOR Strickler, Mervin K., Jr.
TITLE Guidelines for Federal Aviation Administration Regional Aviation Education Coordinators and Aviation Education Facilitators.
INSTITUTION Federal Aviation Administration (DOT), Washington, D.C.
PUB DATE Aug 83
CONTRACT DTFA01-83-Q-82331
NOTE 97p.
PUB TYPE Reports - Descriptive (141) -- Guides - General (050)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Aerospace Education; *Course Content; Educational History; Elementary Secondary Education; Federal Programs; Guidelines; Higher Education; Instructional Materials; Mathematics Education; *Program Implementation; Science Education; *Workshops
IDENTIFIERS *Aviation Education; *Federal Aviation Administration

ABSTRACT

This publication is designed to provide both policy guidance and examples of how to work with various constituencies in planning and carrying out appropriate Federal Aviation Administration (FAA) aviation education activities. Information is provided on the history of aerospace/aviation education, FAA educational materials, aerospace/aviation curricula, FAA responses to requests from schools and colleges, the California Governor's task force on aerospace/aviation education, educating and training aviation education facilitators, and other topics. Additional information in appendices includes: (1) the scope of aerospace education; (2) a list of aerospace course opportunities in various subject areas; (3) a guide to FAA aviation education supplementary materials (listing materials by curricular areas for primary, intermediate grade, and junior high school levels); (4) a description of Project Schoolflight (which promotes the building of aircraft in high schools, vocational schools, and universities); (5) information on Civil Air Patrol (CAP) aerospace education workshops; (6) list of airway science curriculum subject areas (with descriptions of the curricula); (7) a summary of the California governor's task force recommendations on aviation education; (8) information and schedules related to aviation education workshops; and (9) a list of FAA, CAP, and National Aeronautics and Space Adminstration (NASA) regional offices. (JN)

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GUIDELINES
FOR
FEDERAL AVIATION ADMINISTRATION
REGIONAL AVIATION EDUCATION COORDINATORS
AND
AVIATION EDUCATION FACILITATORS

by

Dr. Mervin K. Strickler, Jr.

Pursuant to contract #DTFAOI-83-Q-82331

August 1983

SE041714

"The Commission deeply believes that the problems we have discerned in American education can be both understood and corrected if the people of our country, together with those who have public responsibility in the matter, care enough and are courageous enough to do what is required."

David Pierpont Gardner
Chairman
National Commission on
Excellence in Education
April 26, 1983

U.S. Department
of Transportation
**Federal Aviation
Administration**

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Office of Public Affairs
Aviation Education Program Staff
Washington, D.C. 20591

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INTRODUCTION

The Federal Aviation Administration (FAA) is expanding efforts to attain its objectives by increasing initiatives on the part of its employees in planning and carrying out an aviation education program. Basically, the goal of the FAA Aviation Education program is to:

- make use of tested aviation education techniques in working with students, educators, representatives of local, state and federal government agencies as well as appropriate industries, organizations and members of the public.
- involve FAA employees as resource persons in sharing their expertise with those who will use it in planning and carrying out aviation education programs, projects, activities.
- ensure that FAA's mission attainment makes the fullest possible use of existing resources both within and outside the agency.

This publication is designed to provide both policy guidance and examples of how to work with various constituencies in planning and carrying out appropriate FAA aviation education activities. It is designed to be useful to FAA administrative and supervisory personnel and especially for Regional Aviation Education Coordinators and Local Aviation Education Facilitators. For additional clarification, FAA personnel are encouraged to communicate with either of the appropriate:

- Local Aviation Education Facilitators or
- Regional Aviation Education Coordinator or
- Headquarters Aviation Education Program staff in the Office of Public Affairs.

U.S. DEPARTMENT OF TRANSPORTATION (DOT) - FEDERAL AVIATION ADMINISTRATION STATUTORY AND POLICY GUIDELINES

The FAA Act of 1958 charged the FAA to foster and promote the growth and development of civil aeronautics and air commerce. In 1976 Congress passed legislation (title 49 of U.S. Code, Section 1346a) which provided that:

> "In furtherance of his mandate to promote civil aviation, the Secretary of Transportation acting through the Administrator of the Federal Aviation Administration shall take such action as he may deem necessary, within available resources, to establish a civil aviation information distribution program within each region of the Federal Aviation Administration. Such program shall be designed so as to provide state and local school administrators, college and university officials, and officers of civil and other organizations, upon request, with informational materials and expertise on various aspects of civil aviation."

The FAA Aviation Education Program provides one means of responding to these mandates.

CURRENT FAA POLICY STATEMENT ON AVIATION EDUCATION

FAA Administrator J. Lynn Helms on April 25, 1983 issued the following:

> "FAA's mission - now and in future - depends upon motivated, well-qualified and dedicated employees working together towards our objectives. Our ability to provide for the 'safe and efficient use of the Nation's airspace, facilities, and the vehicles that travel therein' is dependent directly upon the quality of the education of our employees.
>
> In order to assure a technically qualified workforce able to meet the challenges of changing technology, it shall be the policy of FAA to support education at all levels within the limits of our capability to do so.
>
> As Administrator, I encourage FAA employees to assume a more active role in their communities and schools in promoting increased understanding of Aviation, Airports and Air Transportation and their economic, social and career value in our communities and society as a whole. Through such active support for the FAA Aviation Education Program we will help ensure achieving our mission objective and FAA's preeminence as the world aviation authority."

Clearly, FAA has both a statutory mandate and a policy statement endorsing increased efforts to assure that both students and the adult population understand the role of aviation in the total transportation system of the United States. Furthermore, aviation education is useful in assisting FAA to motivate, educate and train the future highly skilled employees needed as the National Airspace System (NAS) is designed to meet the requirements of the 21st century.

FAA AGENCY ORDER 1200.8B

Responsibility for carrying out the FAA Aviation Education program is placed in the Office of Public Affairs (APA-1). (See Agency Order 1200.8B.) The Office of Public Affairs, Aviation Education Programs staff provides the professional guidance to the program. Aviation Education advice is available from the professional staff.

FAA AVIATION EDUCATION PROGRAM PLAN

The success of FAA's Aviation Education Program Plan rests on the degree to which Headquarters, Regional and Local Facility staff understand their roles and responsibilities for carrying out the program.

STRUCTURE

The Federal Aviation Administration Aviation Education Program utilizes FAA's regional organization. The Assistant Administrator for Public Affairs, through the Aviation Education professional staff, coordinates the program activities with the Regional Directors. Each Director designates an individual to serve as Regional Aviation Education Coordinator. Each Regional Coordinator develops local Aviation Education Facilitators to carry out program objectives and activities in local communities at or near FAA facilities.

The roles, responsibilities and relationships between FAA Headquarters, Regions and Local Facilitators are described below.

HEADQUARTERS

The Office of Public Affairs:

- provides overall policy and professional aviation education guidance.
- evaluates and develops aviation education materials for distribution.
- provides a system of aviation education data collection and dissemination.
- encourages and maintains cooperative relationships with key groups and individuals including federal, state and local government officials and agencies,

industry, public and private schools, colleges and universities and education-related organizations including professional, social, service and civic organizations with mutual interests in aviation education.
- develops information services support for special projects such as topical writing contests, aviation-related design competitions and formulation of educational strategies including aviation software program design for use with home and school computers.
- develops and maintains an appropriate recognition program for both FAA personnel and others participating in the aviation education program.
- evaluates the aviation education program on a continuing basis by analysis of field reports.

REGIONS

The Regional Aviation Education Coordinator:

- provides regional aviation education program direction and coordination.
- in accordance with regional needs, identifies and communicates with the appropriate federal, state and local agencies as well as individuals and representatives of industry, education and organizations involved in aviation education.
- develops local aviation education resources within FAA and the private sector.
- develops and maintains a regional aviation education resource center that includes the variety of aviation education materials available from FAA, other government agencies and from industry and other organizations.
- reports aviation education program activities through the Regional Director to the Assistant Administrator for Public Affairs.
- evaluates the aviation education program on a continuing basis by analysis of field reports.

FIELD FACILITIES

Local Aviation Education Facilitators:

- plan and coordinate tours of FAA facilities for educational groups.
- coordinate access to FAA technical resource personnel by educators and others interested in aviation education.

- identify FAA, industry and local organizations and individuals who can provide aviation education resources.
- communicate with school and college staff and teachers and coordinate the use of aviation education resources in their programs.
- represent the FAA at appropriate meetings and conferences in the local area.
- report aviation education program activities through the Facility Manager to the Regional Aviation Education Coordinator.
- evaluate the aviation education program on a continuing basis

AVIATION-AEROSPACE EDUCATION DEFINED

Currently, there are several terms used to describe educational activities, programs and curricular offerings in schools, colleges and organizations. Until the advent of space programs, the most commonly used terms were aeronautical, air-age or aviation education. Now, the term aerospace education has come into increasingly popular use. Basically, aviation-aerospace education is concerned with all the systems or elements included in planning and carrying out safe, efficient aviation-aerospace operations. FAA is concerned with the attitudes that the public in general and young people in particular have toward the design and operation of a modern National Airspace System with its airports, navigation facilities and personnel to operate, supervise and evaluate the system safely and efficiently. Aviation-aerospace education has relevance for all levels of education - kindergarten through the twelth grade as well as college and university levels. It has general education significance - that is, the knowledge and experience one needs to be an informed citizen. It has career, technical and professional implications for those preparing for an active role in aviation or aerospace. From a curriculum or educational offering viewpoint, aviation-aerospace has relevance over the entire spectrum - from alpha to omega or from art to zoology. There will be requests for FAA assistance that are beyond the scope and resources of the agency. However, there are many agencies, organizations, institutions and individuals with experience, expertise and resources. One aviation education objective for FAA personnel is to learn of these resources. One can gain a better understanding of the scope of aerospace - which includes aviation - by noting the schematic which is shown in Appendix one.

One inherent advantage of aviation-aerospace education is that there is nearly universal appeal on the part of both students and teachers in learning more about these topics. Additionally, there are ample opportunities for achieving successful performance or mastery of skills, information and data basic to many of the traditional

disciplines - science, mathematics, English, social sciences, art, music, literature and vocational, technical and professional areas.

As described in the 1983 Federal Aviation Administration, Aviation Education Program Plan:

> "...aviation education seeks to develop attitudes and skills, communicate knowledge, and impart understanding relative to the social, economic, political and technical aspects of aviation. It encompasses all levels from elementary to post-secondary; it crosses all disciplines from Agriculture to Speech and Communications. It has the special advantage of spontaneous pupil interest in aircraft--an interest that motivates them to investigate and understand the physical world, as well as helps them define career goals in aviation. Its benefits to students, teachers and communities have been widely documented and continue to be validated."

For illustrative examples of selected aerospace topics and what curriculum context in which they may be found in schools and colleges, see Appendix two.

By now it should be clear that aviation-aerospace education has relevance for all levels of education and all disciplines. Thus, the services of FAA personnel as resource personnel are in great demand.

HISTORY OF AVIATION-AEROSPACE EDUCATION

The FAA and its predecessor organization - Civil Aeronautics Authority (CAA) 1938-1940 and the Civil Aeronautics Administration (CAA) 1940-1958 have played a significant role in aviation education in the United States.

Any FAA employees embarking on aviation education assignments or activities for the first time should realize they are building on long established foundations and a well-recognized and distinguished record of previous activity and achievement by FAA and its predecessor agencies as well as the work of others in government, industry and education in pioneering aviation education. Aviation education is as old as aviation.

UNDERSTANDING NEW TECHNOLOGY AND ADAPTING IT TO EDUCATION

A study of the history of scientific and technological inventions and developments clearly demonstrates that it often takes a generation or more before a technological breakthrough is understood widely or adopted into school and college curricula. An outstanding exception to this is the airplane. The Wright Brothers made their

historic flight in 1903. The first record of a school adopting an aviation education program shows such an action as early as 1908 in the physics classes of H. Lav. Twinning of the Los Angeles Polytechnical High School. Following World War I great strides were made in introducing people to aviation. One important means of doing this was via the ten thousand pilots who were trained by the United States during the period 1914-1918. The barnstorming activities of thousands of these pilots in communities throughout the nation stimulated widespread press and public interest in aviation.

As early as 1922 Detroit, Michigan public schools were teaching aircraft model building as formal, credit offerings. This program was later expanded to more technical aeronautical and automotive subjects. In 1925 the Galt, California high school flight training and ground instruction program started. In 1926 the Galt Junior College was formed and the aeronautical education program expanded to two years beyond high school. This was the first college offering of flight training.

THE DANIEL GUGGENHEIM FUND FOR THE PROMOTION OF AERONAUTICS

It is interesting to note that the first formal and major impetus to aviation safety and promotion of aviation education came from the private sector. Daniel Guggenheim and his family felt there was huge potential in aviation but that it must be promoted and understood by large segments of society. Thus, in 1926 there was established the Daniel Guggenheim Fund for the Promotion of Aeronautics. One of the first activities undertaken was the creation of a Committee on Elementary and Secondary Education. This committee was responsible for designing and carrying out early aviation education workshops for elementary and secondary teachers who in turn carried back to their schools and communities the information, motivation, techniques and materials for curriculum design, course enrichment and hobby and extra-class activities using aviation. Literally hundreds of schools throughout the nation had excellent aviation education programs by 1930 as a result of the Guggenheim Foundation's far-seeing and generous activity. The Guggenheim Foundation also provided grants to selected universities to start aeronautical engineering and related scientific and technical studies that continue to this day in such prestigious institutions as:

Massachusetts Institute of Technology
Georgia School of Technology
California Institute of Technology
University of Washington
Leland Stanford University
Harvard University Graduate School of Business
Syracuse University
University of Michigan

EARLY UNITED STATES OFFICE OF EDUCATION INITIATIVES

By 1932 the United States Office of Education showed an interest in aviation education by virtue of the publication of a bulletin entitled: "Vocational Training for Aviation Mechanics." By 1936 the Office of Education published another bulletin reporting on examples of programs in all fields of aviation entitled: "Aviation in the Public Schools."

About the same time, in November of 1936, the Bureau of Air Commerce in cooperation with the National Education Association published a fifteen-page article providing information on how and where teachers could obtain information on a variety of aviation topics for use in schools.

THE ROLE OF GERMANY'S PRE-WORLD WAR II AVIATION EDUCATION EFFORTS IN UNITED STATES POLICIES AND PROGRAMS

Many Americans failed to see the significance of the build-up of aviation and related military capabilities in Germany during the decade of the 1930's. The Germans had a huge effort to educate and train young people in gliders and in the study of aviation subjects. In fact, a major motivating force behind the U.S. Congress passage of the Civilian Pilot Training Act (CPT) in June of 1939 was the ominous initiative of the Germans in a variety of aviation manpower developments in the early 1930's. By December 30, 1939 the German Minister of Education published a Decree on Promotion of Aviation In Schools and Universities which he had issued on November 17, 1939. Clearly, this and earlier German actions demonstrated their intent to make the fullest use of aviation education in schools, universities and youth groups to meet their national and war-time objectives. This lesson was not lost on leaders in the United States.

UNITED STATES AVIATION EDUCATION EFFORTS PRIOR TO AND DURING WORLD WAR II

The Civilian Pilot Training Program (CPTP) started in 1939 and developed one-hundred thousand needed pilots by the outbreak of World War II. Interestingly enough, the original idea for the program was not primarily military. Rather, as conceived by Robert H. Hinckley,* in 1938 the program:

> "...was planned originally as an experiment in vocational training that would give a boost to the small flying school

---

* For a detailed story of Hinckley's remarkable contributions note the FAA World article by Sam Milner, May, 1983 issue.

> and the light plane manufacturer, with the added benefit to the armed services of a reserve of knowledgeable pilots."

The first participants in the program actually preceded the CPTP legislation of June, 1939. President Roosevelt announced in a December 27, 1938 press conference that:

> "...he had approved a Civil Aeronautics Authority (CAA) plan to boost the private flying industry by annually teaching 20,000 college students to fly. He added that it would be tried out in an experimental program involving 330 young men and 13 institutions which would get under way early in the new year, financed by $100,000 of National Youth Administration money."

By the time the United States entered World War II in December of 1941, thousands of pilots had been trained in the CPTP. By Executive Order of the President on December 13, 1941 all pilot training facilities of the CAA were to be "... exclusively devoted to the procurement and training of men for ultimate service as military pilots, or for correlated non-military activities." Thereafter until the program was suspended in 1944, the program was known as the CAA War Training Service (WTS).

Author Patricia Strickland who has written the definitive story of the CPTP-WTS programs has justifiably written:

> "During its five-year life-span the Program chalked up a safety factor that was something of a Twentieth Century miracle, and at the same time:
>
> Revolutionized the art of flight instruction.
> Produced thousands of instructors for the armed services, including the Royal Canadian Air Force.
> Produced co-pilots for the airlines, ferry pilots for the Air Forces and Navy.
> Initiated a flight program for Negroes. The famous 99th Pursuit Squadron was staffed by the CPTP.
> Indoctrined glider pilots for the Air Force, and Grasshopper pilots for the Field Artillery.
> Provided the Weather Bureau with pilot-meteorologists.
> Instituted a Research Program that brought about radical changes in pilot selection (among a host of other accomplishments) and opened research areas which are still being explored.
> Gave women an active role as students and instructors."

The results of that monumentally successful aviation education program are still felt today. In fact, there is a substantial number of men and women who were active participants in that

program who hold responsible aviation positions in industry, government and education.

This achievement was possible with the cooperation of the federal government, 1,132 educational institutions - mostly colleges and universities-and 1,460 private contractors.

At the outbreak of World War II less than one-hundred and fifty high schools in the United States taught aviation. Because of the emphasis on pre-flight aeronautics study during the war, fourteen thousand public, parochial and private high schools with an enrollment of a quarter of a million students, offered aviation studies. With the end of the war, by 1947 less than ten percent of the nation's 28,000 secondary schools offered aviation courses. However, many elementary and secondary schools began programs of integrating appropriate aviation activities in existing courses and programs.

Any objective analysis of aviation education during this period must conclude that there were huge and successful efforts made to use aviation as a subject of study and thereby to attain national objectives.

POST WORLD WAR II AVIATION EDUCATION PROGRESS

Following World War II, while formal aviation education programs in schools and colleges declined, the so-called G.I. Bill or veterans training legislation made it possible for more than 500,000 World War II and Korean War veterans to receive flight training.

Gradually, elementary, secondary and post-secondary educational institutions started programs of teacher workshops and in-service education. Much of the initiative for such activity came from the Civil Aeronautics Administration and from airlines, aircraft manufacturers and organizations such as the Civil Air Patrol (CAP).

By 1952, budget and manpower reductions greatly reduced the CAA aviation education programs. However, others such as CAP and various aviation industry programs expanded.

In the late 1950's the National Aeronautics and Space Administration (NASA) and the Federal Aviation Administration (FAA) were created by Congress and each agency established educational programs to assist in mission attainment.

During this period - 1950's to 1970's - much emphasis was placed on the design and distribution of materials of instruction for teachers and students. Summer workshops for teachers and regular in-service programs during the school year made it possible to give educators

confidence-building learning experiences in all phases of aviation and space. FAA, NASA and CAP were the leaders in planning and carrying out these programs. Literally hundreds of teacher workshops were held each year and many thousands of teachers were trained.

Aircraft manufacturers increased their activities during this period and companies such as Cessna, Beech and Piper played an increasingly important role in providing materials and guest lecturers for aviation education projects.

Airlines, too, stepped up their efforts to educate the public via aviation education. American, Eastern, Trans-World and United Airlines were among the most active in the field.

Various industry, government and education interests joined forces in the early 1950's and formed an organization - the National Aviation Education Council-to act as a clearinghouse and focal point for educators and others with common interests in education and aviation.

Last, but by no means least, during this period various educational professional organizations and associations endorsed the concept of using suitable aviation topics and activities to enhance education. Organizations such as: The American Association of School Administrators (AASA), the American Council on Education (ACE), National Secondary School Principals Association (NSSPA) and others issued policy statements supportive of aviation education.

Additional support for aviation education programs resulted from various research and documentation efforts that demonstrated the value of such programs in encouraging students to stay in school and in improving other subject matter understanding.

Within the last fifteen years, a new emphasis on career education by educators, industry and government proved to be helpful in assisting minorities and women to aspire to, qualify for and enter hitherto unavailable positions in aviation and space.

By the start of the decade of the 1980's aviation-aerospace education had grown in ways that built upon past experiences that extend back to the earliest examples of relating aviation and education. Thus, based on a past record of achievements, those starting aviation education activities for the first time must realize there is substantial basis for predicting success and that there is a well-established tradition of government, industry, education and interested organization cooperation in aviation education.

STARTING AN FAA AVIATION EDUCATION PROGRAM

Faced with the responsibility of starting an FAA sponsored aviation education program, activity or support of education, where does one begin? The first determination one must make is the statutory and/or policy basis for the program. See page 2 for both statutory and policy guidelines. Clearly, the FAA is charged by law and encouraged by policy to plan, organize and carry out an aviation education program.

For details of the 1983 initiatives, see: Federal Aviation Administration, Aviation Education Program Plan, Office of Public Affairs, 1983. Also, consult Agency Order 1200.8B. Upon reviewing the foregoing documents and discussion with one's supervisor, it should be clear that aviation education activities appropriate to FAA mission attainment are both encouraged and mandated.

UNIQUE FEATURES OF EDUCATION IN THE UNITED STATES

There are, of course, illustrative examples of realistic aviation education functioning at headquarters, regional and local facility or community levels.

To understand examples of what aviation education FAA personnel should attempt to do, one must first insure that there is clear understanding of the nature and extent of education in the United States.

Education in the United States is unlike that in most other countries of the world. We do not have a national, centrally-directed, standardized system of education. We do have a diverse, pluralistic and local and state controlled system of education made up of both public and private or parochial institutions. This is true of elementary, secondary and college and university education.

One of the great strengths of education in the United States is the local autonomy that boards of education and boards of colleges and universities have to guide their own programs.

Factually, a local school - elementary, secondary or post-secondary - can do just about anything it wishes to do providing it does not violate a municipal, county, state or federal law.

Most states prescribe what local schools must do insofar as certification of teachers is concerned and they generally recommend minimum standards for graduation by stipulating the minimum number of credits required and the distribution of science, English and related studies that must be accomplished. However, in most states these requirements leave some latitude for local application or

offering of elective or other courses, programs or activities. Most states also specify the minimum number of days that are required for the school to be open in order to meet their attendance standard. This standard is, frequently, that necessary to receive state financial support.

On the federal level, the primary regulatory role is to ensure that schools receiving federal funds meet the legal or statutory requirements for the funds. Most federal programs are in what is known as categorical aid. That is, the aid, funds or services provided are specified by the particular legislation enabling that special program or project. In recent years, the number of categorical programs administered by the United States Department of Education(USDE) has grown to nearly two hundred.

Except for a few specified areas, neither federal nor state laws require schools and colleges to comply with all of their mandates. There are some schools and colleges - by choice - that do not receive federal funds. Likewise, there are some schools and colleges that exercise their privilege of not accepting funds that are optional.

Most schools and colleges in the United States do fall under state and federal regulatory procedures of a variety of kinds. Those who are employees of FAA - a regulatory body - need to realize that one of the first things an educator will ask is whether or not the particular aviation education project being discussed falls under the purview of FAA's regulatory responsibilities. A second question may be: does FAA provide funds for programs it is encouraging? *

AVIATION EDUCATION PROGRAMS THAT MUST MEET FAA REGULATORY STANDARDS

What must an educator do if one wishes to start a program covered by FAA regulatory standards? The simplest way to answer an educator's question on this topic is by stating that any educational activity that attempts to train pilots, maintenance technicians and other airmen subject to FAA rule-making must, of course, meet the currently applicable Federal Aviation Regulations (FAR's). For example, if a community college or high school decides it wants to offer a pilot training program or an aviation maintenance technician program the applicable regulations as to curriculum, written and practical tests and demonstrations of performance as prescribed by relevant FAR's must be met.

There are many sources of help within FAA for educators planning such projects. One of the first places to seek advice is from the nearest FAA Aviation Standards Office. In many cases, the relevant FAR's will prescribe curriculum, areas of study, medical standards and other applicable requirements. In some instances FAA published material will include both written and practical test guides. In

* No. Material and resource personnel are provided without charge.

many cases, FAA Advisory Circulars will provide both technical data and very useful study material. The FAA Advisory Circular checklist - usually revised annually - should be consulted. AC No: AC 00-2WW currently includes several hundred entries on a wide range of aviation topics. Some are free upon request for one copy and other more voluminous ones may be purchased for a nominal fee from the U.S. Government Printing Office.

FAA PUBLICATIONS OF INTEREST TO EDUCATORS

FAA employees frequently are unaware of the vast array of publications available to the public that range from simple to complex and that include free as well as items for which there is a nominal charge. Every facet of FAA missions, regulations and technical advisory roles has available some publications. Factually, there are examples of some educational programs that will need only a few FAA publications. Other comprehensive aviation education programs - especially those involved in training planners, managers, pilots, engineers, technicians, educators and others-may require Advisory Circulars, FAR's, Technical Standard Orders (TSO's), Airman/Aircraft Information, Scientific and Technical Reports, Aeromedical Reports, Planning and Forecast Projections, Flight Safety Materials and the List of FAA Aviation Education Materials.

It is recommended that each person engaged in the Aviation Education program of the FAA carefully study the publication: FAA-APA-PG-6, Guide to Federal Aviation Administration Publications. This publication should be kept as a readily available reference to answer phone. correspondence and in-person inquiries. Many technical, scientific, aviation-oriented inquiries by educators may be answered in one or more of the extant publications in this excellent 57 page booklet.

AVIATION EDUCATION MATERIALS AVAILABLE FROM FAA

FAA has, over the years, developed and distributed a large variety of materials for use primarily by teachers and their students. Many of these instructional materials, curriculum guides, aviation education activity suggestions and aviation career materials are currently available. Others are being revised and up-dated. Still others are in the process of being designed and developed. Following is a brief list of those now available or to be available within a short period of time (early 1984).

The publications listed are designed to provide educators and/or students with aviation education and aviation career guidance materials which may enhance or enrich general study programs and inform students about aviation careers. One publication offers a model curriculum for a high school. These materials are free. In many instances, simply making one or more of these publications available

to a teacher will start an aviation education chain reaction of activities, projects, study.

FAA Aviation Education Materials (1983):

GA-20-30	Aviation Science Activities for Elementary Grades.
GA-20-30B	Demonstration Aids for Aviation Education.
GA-300-135	Teachers' Guide to Aviation Education.
GA-300-121	A Trip to the Airport.
GA-20-62	How We Made the First Flight. In Orville Wright's own words, a description of his and Wilbur's first flights.
GA-20-62S	Nuestro Primer Vuelo. Orville Wright's story in Spanish.
GA-300-143A	August Martin Activities Book. Learning activities based on a biography of the world's first black airline pilot.
GA-300-143B	A Model Aerospace Curriculum. An operational model of a high school planned with all curricular offerings related to aviation, aerospace, transportation. The school is named for August Martin.
GA-300-122	Career Pilots and Flight Engineers.
GA-300-123	Aviation Maintenance.
GA-300-124	Airport Careers.
GA-300-125	Aircraft Manufacturing Occupations.
GA-300-126	Airline Careers.
GA-300-127	Flight Attendants.
GA-300-128	Government Careers.
GA-300-144	Women in Aviation and Space.

One of the first suggested actions of anyone interested in working with educators via the FAA Aviation Education Program is to study the above materials and become familiar with what is available to teachers. To provide additional assistance in understanding how educators make use of resource materials such as those available from FAA, note Appendix three which serves as a guide to FAA aviation education materials for Regional and Local Aviation Education Coordinators and Facilitators.

CHANNELS OF COMMUNICATION WITH EDUCATIONAL SYSTEMS

Educational systems - elementary, secondary and post-secondary - like any organized institutions have a system of appropriate communications with elements of the system through those outside the organization. For example, the question may arise: What procedure should one use to let educators know that you are an FAA Aviation Education Facilitator and that you are available to provide some services to the local school or college? First, one must recognize that the head of an educational system wants to be aware of what is happening. Thus, in a town or city with several schools, one should go to the office of the superintendent, indicating what one is willing to do and ask to be referred to the appropriate person. If the system has several elementary schools, a high school and/or a vocational or technical high school the superintendent will generally make a referral to the appropriate school. In some ihstances it may be preferable to meet with a person or persons in the central office of the system to determine the nature and extent of the services FAA has available. In fact, FAA has materials, potential guest lecturers and resources that are applicable at all levels of education. The key point is to recognize that there are educational channels and make use of them.

In some instances, the local principal of the school may be the correct person with whom to start. This is especially true if one knows that the resources available are appropriate for that school.

In a college or university there are several options for communicating. First, one may go directly to the president and ask to be directed to the appropriate school, college or department within the institution (this assumes a large university). In a smaller college or community or junior college there are usually a number of divisions or departments. It is appropriate to go directly to the head of a given department if you believe your services will be useful in that particular segment of the institution.

FAA employees have many opportunities for very effective communication with schools via informal channels. For example, if you are a member of a Parent-Teacher Association (PTA) you will have excellent opportunities to let administrators and teachers know that you are a potential aviation education resource if the school is interested. Likewise, the children of FAA employees are encouraged to take relevant FAA aviation education materials to class to give to their teacher or - when appropriate - share with fellow students.

Quite often FAA employees are members of a board of education or are trustees of a college or university. In such instances, there are opportunities to let the institution know of available FAA aviation education resources while staying within the accepted protocol of the institution.

The main point to keep in mind is that educational institutions at all levels, both public and private, welcome the offer of assistance providing it is done in a logical fashion.

TYPICAL REQUESTS FAA MAY EXPECT FROM EDUCATORS AND SUGGESTED RESPONSES

When educators are aware that FAA is interested in aviation education and cooperative efforts that are appropriate to FAA's resources, following are illustrative examples of requests and possible responses:

- How may I arrange for my students to visit a local FAA facility? The first thing to determine is the age and educational level of the students. Kindergarten or first and second grade youngsters, for example, may not be suitable for a tour of an Air Traffic Control Tower or Air Route Traffic Control Center (ARTCC). Whatever level of student that does visit, it should be made clear that sufficient adults are along to provide supervision of the students. Furthermore, efforts should be made to assure that students are prepared in advance of the visit by being briefed on what they will see, the role of the facility and the different types of work being performed. It is always helpful, too, to list terms, acronyms, specialized vocabulary that will be heard or observed during the visit. In brief, care should be taken that the age and experience level of those visiting are appropriate to assure maximum benefit from the experience.

- An elementary and/or secondary school administator communicates with the nearest FAA facility and asks what resources FAA has to help them in areas such as: aviation materials, planning an aviation orientation or workshop for teachers, providing speakers on aviation topics or participating in a career conference for students and teachers.

  Response to a request for materials may be readily handled by mailing a list of the aviation education materials available from FAA. Providing a speaker or speakers will require determining what the school's objective is and then coordinating a suitable person or persons. The most important thing to keep in mind is that a speaker can discuss his or her job and put that in the context of the total FAA mission. The FAA Speakers Kit standard

overall talk will provide valuable, technically accurate information to incorporate in a speech. It is important to realize that speakers performing this service are really role models for the audience. In career conferences, the key point is to let the audience know what you do and what other kinds of jobs there are in FAA and what preparation is either required or helpful.

Requests for planning an orientation or workshop-type experience for teachers is somewhat more complicated. First, determine the objectives the educational institution has for the project. Then determine how much time is available - several hours, several sessions of one or more hours' duration, etc. At this point, depending on the resources, experience level and time available of the FAA personnel, it may be prudent to call on additional local resources to be of assistance. Such resources may include a person from the Ninety-Nines, Civil Air Patrol or other aviation-oriented organization or industry. In most instances, what the educators want is to learn more about various facets of aviation. FAA personnel can provide this directly and coordinate additional expertise from other sources as needed.

- A local school administrator asks FAA: what might be done to plan a school-wide aviation education program? Such a request will require some discussion to determine what objectives the administrator has in mind and what resources are available within the school system. If it is determined that an extensive system-wide program is desired, the next best step may be to suggest the formation of an ad hoc planning, steering or advisory committee made up of representatives of the school system and various local aviation resources including FAA. Several meetings of such a committee will enable the local educators and aviation resource personnel to plan an appropriate approach that meets mutual objectives. A key point to keep in mind is that such a plan as described is the school's responsibility. FAA and others providing advice, assistance and technical expertise are performing an advisory role.

- The principal of a local vocational or technical high school or the head of an industrial arts department asks if FAA has any information on the possibilities of actually building an aircraft in school. How

should such a request be answered?

The FAA in cooperation with the Experimental Aircraft Association (EAA) has had many years of experience in what has come to be known as Project School Flight. This is a program where high school students work on the actual construction of an aircraft that will fly. Usually the aircraft is sold when it is completed and the funds are used to buy the materials with which to construct another aircraft. Students learn a variety of skills in such projects including:

reading plans and specifications
working with various materials - metal, cloth, wood, plastic
using a variety of tools
teamwork
working to close tolerances.

The FAA involvement in this educational program includes having an FAA maintenance inspector or designee come in to the school and actually inspect such things as welds, proper construction and installation of various aircraft and engine components. Thus, the aircraft that is completed must meet the approved plans and specifications and the workmanship must meet safety and structural standards of integrity.

The several hundred high schools throughout the United States in which this program has successfully operated, are enthusiastic about the educational and career benefits. Students, teachers, administrators and parents are invariably high in their praise of this program. For more details on this excellent "hands on," "learning-by-doing" project, note Appendix four.

SCIENCE, MATHEMATICS AND AVIATION-AEROSPACE EDUCATION

FAA employees are fortunate in being active in a technological and scientific field that has such inherent interest for young and old alike. The subjects of science, mathematics and electronics relate directly to the mission of FAA.

Simply planning a flight requires considerable science and mathematic literacy. The study of weather phenomena, how and why an airplane flies, basic air navigation problems, weight and balance of an aircraft for safe flight all relate to disciplines

that are not generally understood. Experience has shown that elementary and secondary students who may not otherwise be interested in science and mathematics soon discover that they must become knowledgeable in these areas if they are to successfully pursue their aviation interests and activities. Thus, they possess that basic motivation that enables them to learn things of which they might not otherwise be interested in studying.

One need only examine the schematic in Appendix one and note the course possibilities in Appendix two to see how significantly science and mathematics undergird aviation and aerospace studies.

Examination of a currently popular high school text - Aerospace the Challenge, 1983 edition, published by Civil Air Patrol - shows the nature and extent of science and mathematics in just three of the six sections of this publication. Following are topical headings and chapter titles with major areas of emphasis listed:

Part Two: The Aerospace Environment

Chapter

1 The Atmosphere
- What is the Atmosphere?
- Describing the Atmosphere
- Review of the Atmosphere
- Roles of Water and Particulate Matter
- Atmosphere in Motion

2 Weather Elements
- Air Masses and Fronts
- Clouds
- Terrain Factors
- Wind Shear
- Clear Air Turbulence
- Normal Weather Patterns

3 Weather Forecasting
- Weather People and Service
- Weather Data Collection
- Communicating Weather Data
- Weather Analysis and Forecasting
- Forecasting as a Service

4 Aviation Weather
- Weather Hazards
- Severe Weather
- Arctic and Tropic Weather

5 From the Sun to the Earth
- Interplanetary Space
- Sun
- Mercury
- Venus

Earth
Cislunar Space

6 Space Beyond Earth's Orbit
Earth's Moon
Mars
The Asteroids
The Outer Planets
Comets
The Milky Way and Beyond
Origin of the Universe

Part Three: Principles of Aircraft Flight and Navigation
Chapter

1 Basic Aeronautics
Aerodynamic Forces
Airfoils and Flight
Relative Wind
Angle of Attack and Lift
Airspeed and Ground Speed
The Four Forces of Flight

2 Aircraft Motion and Control
The Axes of Rotation
Weight, Balance, and Load Factors
Flaps, Slats, Spoilers, and Drag Devices
Controlled Flight

3 Aircraft Structures and Instruments
Stresses and Structural Materials
The Fuselage Structure
Wings
Empennage
Landing Gear
Hydraulic and Electrical Systems
Aircraft Instruments

4 Aircraft Propulsion
Aircraft Reciprocating Engines
Aircraft Turbine and Ramjet Engines

5 Navigation Principles
Maps and Map Projections
Sectional Charts and Airports
Airspace and Airways on the Sectional
Other Types of Aeronautical Charts
Factors Influencing Air Navigation

6 Air Navigation, Aids and Systems
Basic Air Navigation
Electronic Aids to Air Navigation
Air Navigation Systems

Part Five: Rocketry and Spacecraft

Chapter

1 Rocket Fundamentals
- Rocketry's Beginnings
- Some Seventeenth-century Laws
- Application of Newton's Laws to Rocketry
- Rocket Systems
- Specific Impulse and Density Impulse

2 Chemical Propulsion
- Oxidation and Combustion
- Solid Propellants
- Liquid Propellants
- The Liquid Propellant Engine
- Hybrid Propellants

3 Advanced Propulsion Systems
- Heavy-lift Launch Vehicles
- Thrust in Space
- Electric Propulsion
- Nuclear Propulsion

4 Guidance and Control
- Homing Guidance
- Command Guidance
- Inertial Guidance
- Control Systems

5 Orbits and Trajectories
- Orbit and Trajectory Defined
- Basic Orbital Trajectories
- Ballistic Trajectories
- Sounding Rocket Flights
- Types of Orbits

6 Civilian Spacecraft
- Spacecraft: Some Definitions
- Unmanned Satellites and Probes
- Manned Satellite Spacecraft

Current national discussions about education in the United States clearly point to the need for improvement of performance in science and mathematics.

The April 26, 1983 report of the National Commission on Excellence in Education identified a number of deficiencies that it characterized as "Indicators of Risk." Particularly relevant for those concerned with participating in FAA's expanded Aviation Education Program are these indicators:

- International comparisons of student achievement, completed a decade ago, reveal that on 19 academic tests American students were never first or second and, in comparison with other industrialized nations, were last seven times.
- Some 23 million American adults are functionally illiterate by the simplest tests of everyday reading, writing, and comprehension.
- About 13 percent of all 17-year-olds in the United States can be considered functionally illiterate. Functional illiteracy among minority youth may run as high as 40 percent.
- The College Board's Scholastic Aptitude Tests (SAT) demonstrate a virtually unbroken decline from 1963 to 1980. Average verbal scores fell over 50 points and average mathematics scores dropped nearly 40 points.
- College Board achievement tests also reveal consistent declines in recent years in such subjects as physics and English.
- There was a steady decline in science achievement scores of U.S. 17-year-olds as measured by national assessments of science in 1969, 1973, and 1977.
- Between 1975 and 1980, remedial mathematics courses in public 4-year colleges increased by 72 percent and now constitute one-quarter of all mathematics courses taught in those institutions.
- Business and military leaders complain that they are required to spend millions of dollars on costly remedial education and training programs in such basic skills as reading, writing, spelling, and computation. The Department of the Navy, for example, reported to the Commission that one-quarter of its recent recruits cannot read at the ninth grade level, the minimum needed simply to understand written safety instructions. Without remedial work they cannot even begin, much less complete, the sophisticated training essential in much of the modern military.

Clearly, FAA personnel have a fine opportunity to further agency mission attainment via aviation education program participation. Concurrently, significant contributions will be made to moving ahead in improving the quality of education in the United States.

SUGGESTED RESPONSES TO REQUESTS FROM COLLEGES AND UNIVERSITIES

The same basic principles apply to handling requests from colleges or universities as described in the preceding material. Frequently, higher education requests may be for technical, scientific, management information or advice. As mentioned previously, if the request is for an FAA regulated program, the appropriate FAR's, Advisory Circulars and/or other information should be made available. Quite often a university exploring the offering of an aviation education program will want to know what other post-secondary institutions offer courses, or programs. The University Aviation Association (UAA) is an excellent source and publishes a directory of such institutions.

If a college or university requests information on other institutions that offer aviation or aerospace education workshops for teachers, the best single source listing of such projects is the Civil Air Patrol (see Appendix five).

In many instances, a college or university with an aviation education program can provide a variety of data to FAA personnel who are asked to help other similar educational institutions.

HANDLING QUESTIONS ABOUT THE FAA AIRWAY SCIENCE CURRICULUM

The FAA Airway Science Curriculum project is a landmark effort to make use of selected colleges and universities in meeting some of FAA's personnel recruitment goals. Basically, the project assumes that colleges and universities that have relevant aviation offerings can help to provide well-educated management and technologically-oriented personnel for FAA to employ. This program was developed by FAA Administrator J. Lynn Helms as a long-term response to the August, 1981 strike and subsequent firing of air traffic controllers. FAA used the technical, professional and educational advice and assistance of the University Aviation Association (UAA) and developed five curriculum outlines. The five areas are:

- Airway Science Management
- Airway Computer Science
- Aircraft Systems Management
- Airway Electronic Systems
- Aviation Maintenance Management

FAA has already identified a number of colleges and universities willing to offer the FAA approved programs. More are needed and welcome. The planning that has been done for this program may well be of use to colleges and universities that do not wish to have a total similar program but may wish to adopt some elements for their purposes and clientele. Thus, a complete listing of the

Airway Science Curriculum is shown in Appendices six and seven. This material may prove useful in answering an inquiry from a college or university person wanting information as to what programs are being offered by some colleges and what programs might be of interest to potential employers including FAA as well as the aviation industry.

One of the most unusual features of the FAA Airway Science Curriculum project is that the U.S. Office of Personnel Management (OPM) has given approval to a Demonstration Project wherein graduates of this program may be hired directly by FAA without regard to the usual hiring criteria and system.

The FAA occupation areas for which hiring authority for this program has been approved by OPM are shown below with the Curriculum Concentration Area(s) (as described in detail in Appendix seven).

FAA Occupation	Curriculum Concentration Area
Air Traffic Control Specialist	Airway Science Management Airway Computer Science Aircraft Systems Management
Electronics Technician	Airway Electronic Systems
Aviation Safety Inspector (General Aviation Operations)	Aircraft Systems Management
Aviation Safety Inspector (General Aviation Maintenance)	Aviation Maintenance Management
Computer Systems Programmer/Analyst	Airway Computer Science

During the next five years there is authorization for FAA to hire graduates of the Airway Science Curriculum programs in the job categories and numbers shown below:

	1984	1985	1986	1987	1988
Air Traffic Controller	70	215	355	355	355
Electronics Technician	25	72	122	122	122
Aviation Safety Inspector	4	10	18	18	18
Computer Science	1	3	5	5	5
TOTAL	100	300	500	500	500

A research project is planned to compare employees hired via this program with those hired through the normal channels. Clearly, this is an unusual program that has already been well received by those educators and educational institutions aware of it. Hopefully, it will provide FAA and other employers with a better generally and technically educated employee with great potential for management and upward mobility.

In answering questions from educators about the Airway Science Curriculum project, the following includes information that may prove of value:

- FAA established this program as a critical human link to reconstituting and revitalizing the National Airspace System (NAS).
- Emphasis is placed on the educational background required to understand the technical and managerial concepts contained in the NAS of the future.

In addition to normal academic core requirements, the generic airway science core curriculum contains courses to provide a student with strong conceptual foundations in mathematics, hard sciences, computer science, management and aviation. Perhaps most importantly, the curriculum contains five areas of concentration which will prepare a student for entry level positions in specific career fields, both in government and industry.

The curriculum was designed with several basic principles in mind:

- It meets normal university academic and accreditation requirements.
- It conforms to the UAA College Aviation Guidelines.
- It has the flexibility to allow any college or university the options to offer any number of the five areas of concentration according to their individual resources.
- It will be attractive to students seeking careers both in government and private sectors of the aviation industry.

This unique college and university program will undoubtedly play a key role in providing well-educated employees for responsible positions in government and industry in the years ahead.

In the event of questions about this program that cannot be answered from the materials in this publication, questions should be directed either to Regional Aviation Education Coordinators or on a national basis to:

Mr. Don Rock
Director of Personnel and Training
Federal Aviation Administration
Washington, D.C. 20591
Telephone: 202-426-9041

or

Mr. David Carmichel, AAC-3
Federal Aviation Administration
Mike Monroney Aeronautical Center
Oklahoma City, Oklahoma 73125
Telephone: 405-685-4524
FTS: 749-4524

THE ROLE OF STATE ASSOCIATIONS AND ORGANIZATIONS

In many states, representatives of education, industry and government have formed advisory committees or organizations to share information and advice concerning aviation-aerospace education. In some states the chief state school officer - the state commissioner of education or the state superintendent of public instruction - forms an advisory committee made up of a cross section of education, industry and the general public. Such committees are often asked to review materials, programs, policies and activities for use in the schools of the state.

Sometimes such committees are established by the department of aeronautics of the state. In other cases the two state level departments - education and aviation - join together in sponsoring a committee.

In recent years organizations have been formed on a state-wide basis to share information, plan and conduct state-wide conferences and recognize significant leadership. California, Iowa, Nebraska, Pennsylvania, Texas, Maryland and Hawaii are just some of the states that have had or still have such organizations. They are often known as the ___(state)___ Aviation and/or Aerospace Education Association or Organization.

FAA employees are encouraged to take part in planning and operating such organizations. This is one means of keeping in touch with what is happening on a state-wide basis and of being of service to further FAA's Aviation Education Program goals.

STATE-WIDE EFFORTS UNDER SPONSORSHIP OF THE GOVERNOR

Within the last fifteen years there have been noteworthy examples of aviation-aerospace education projects on a state-wide basis under the sponsorship of the governor of the state. In Tennessee, Arkansas and California the respective governors planned and carried out unusual initiatives. In Tennessee the late Governor Buford Ellington and his successor Governor Winfield Dunn planned a project in cooperation with the Tennessee Department of Aeronautics, the State Commissioner of Education and the Federal Aviation Administration. In effect the Governor wrote to each of his fellow governors and invited them to send representatives from the departments of aviation and education to report on the progress, problems and needs of their state insofar as aviation-aerospace education was concerned. The conference amounted to a nation-wide show and tell of aviation education. Several years later a similar conference was sponsored by then Arkansas Governor Dale Bumpers. This conference included similar reports but also featured progress made since the previous national conference.

In both instances - Tennessee and Arkansas - conference participants and reports included the respective state officials from education and aviation as well as the many sources of aviation and aerospace education professional help such as government agencies - FAA and NASA - along with representatives of aviation companies and organization such as Civil Air Patrol (CAP), Aircraft Owners and Pilots Association (AOPA), and various publishers of magazines, books and material on aviation or space. This technique of nation-wide or regional information and experience sharing may be worthwhile to repeat at some future date. As an FAA Aviation Education Facilitator, you may be asked to help plan or take part in such a project.

THE CALIFORNIA GOVERNOR'S TASK FORCE ON AEROSPACE-AVIATION EDUCATION

In 1969, then Governor of California Ronald Reagan established a thirty-person Task Force to examine needs of the state in this field and forward recommendations for appropriate action. It is interesting to note the scope and objectives of this group as described in the report:

> "On March 25, 1969 Governor Ronald Reagan appointed a 30-member Aerospace-Aviation Education Task Force under the chairmanship of Congressman Don H. Clausen (First District, California). These ladies and gentlemen were from every aspect of aerospace, aviation, education and government.
>
> The scope of activities to which the Task Force was to devote its attention was to include, but not be limited to the following:
>
> - To assemble a group of aviation and aerospace experts, scientists, educators, state and governmental representatives to advise the Governor on matters pertaining to aerospace education throughout the schools and colleges of California.
> - To study and select pertinent recommendations for the adaptation of space and aviation concepts in the elementary, high school, and junior college levels of the State based upon existing and projected requirements of the aviation and space industries.
> - To develop a statement for the governor's possible use in reporting to the Legislature on the needs of education and training in aviation and space sciences based upon the opinions of the Statewide Aerospace Education Advisory Committee to the State Superintendent of Public Instruction, and all other organizations with particular concern for education in these fields of endeavor.

- To learn enough about existing aerospace and aviation education programs to make recommendations for the use of such programs as models or changes that should be implemented to strengthen them.
- To prepare a statement of economic implications of aviation and space sciences for the State of California to be distributed to all educators assigned the task of curriculum preparation and evaluation.
- To confer with the State and Federal agencies assigned aviation education responsibilities, learn about the obstacles confronting implementation of appropriate programs and recommend solutions to these problems.
- Due to the combination of Intrastate, Interstate, International, and Intercontinental nature of air travel and traffic operations, future activities will require participation and coordination with other State aerospace education councils, the Federal Aviation Administration, and the National Aerospace Council Conferences that must inevitably evolve as we keep pace with the rapidly changing technological factors in aerospace and aviation enterprises."

In this state-wide project, the California Department of Aeronautics and the California Superintendent of Public Instruction cooperated with Task Force members from industry, government, education and a variety of professions.

Although completed twelve years ago, the recommendations of the Task Force are timely today. See Appendix eight for the twenty-two recommendations.

Clearly, this unique project is an example of state-wide action that may be worthy of emulation in states where the community of interests coincide. In any event, FAA Aviation Education Coordinators and Facilitators should be familiar with this example of what can be done on a state-wide basis. Limited numbers of copies of the Report of the Governor's Task Force on Aerospace-Aviation Education are available from the FAA Headquarters, Office of Public Affairs.

REPORTING REGIONAL AND FACILITY AVIATION EDUCATION ACTIVITIES

The Office of Public Affairs is responsible for compiling reports on the nature and extent of aviation education activity. These reports will be used in a variety of ways. Among these are: for preparing the annual report to Congress, to plan resource materials support and to evaluate the overall effectiveness of the program.

The actual format of the report may vary from region to region. However, the basic information needed from all regions is standard. A suggested format for the report follows:

Suggested Format for Aviation Education Activity Report
to Office of Public Affairs, APA-1

I. Description of the activity - school visits, teacher workshops, PTA meetings, conferences, conventions, career days, demonstrations, tours, technical assistance, etc.

II. Individual contacted; group or institution represented; location.

III. Purpose of activity:

Outcome:

Follow-up action planned:

IV. Number in audience, or receiving information; age/grade level.

Some guidelines for reporting aviation education activities in the format described above are as follows:

The information gained from the report items will be accumulated to provide continuing data which will enable the Office of Public Affairs to plan more effectively.

The following paragraphs provide the details of what information is desired. Each Regional Aviation Education Coordinator should modify or add to the format to elicit from local facilitators in his/her region any additional information for Regional planning and reporting purposes.

I. Description of the activity - any activity or event having direct or indirect impact upon the local, regional, state or national formal educational system, from kindergarten level through college level, including teacher-training. Examples of such activities or events would include visits to schools, classrooms, education officials; participation in teacher workshops/seminars; demonstrations or technical-type assistance in educational settings; speeches or exhibits at conferences, conventions, career days related to the educational community; briefings and/or speeches before school boards, PTA meetings, or professional educator groups.

II. Individual contacted; group or institution represented; location - Give the name and title or position of the person contacted, the name of the school group, institution, or organization represented, and the location (mailing address).

III. Purpose of activity - Be more specific than "EDUCATIONAL." Examples could be: To provide FAA educational material, or to brief school officials about careers in aviation, or to speak to the sixth grade class about aviation weather, or to inspect work on an airplane the industrial arts class is building.

Outcome - Examples: Provided a set of elementary teacher materials, or left set of career material in the career guidance center or library, or children asked many questions about air traffic control, or school principal referred to the curriculum coordinator, or asked to speak to the science teachers.

Follow-up action planned - Specify whether further visits, telephone calls, materials to be supplied, other referrals etc., are to be acted upon.

IV. Number in audience, or receiving the information; age/grade level - Examples: Thirty elementary teachers; school principal only; thirty-five students in 6th grade class; exhibit drew 1500 inquiries from teachers and parents on aviation careers, etc.

A REGIONAL EXAMPLE

In order to provide an illustration of what one region has found to be successful, background on the Eastern Region's Aviation Education Facilitators report is provided. In this case, the region requests quarterly reports from field facilities. The Aviation Education Activity Report used provides data on a chronological basis and identifies the field office facility (FOF), the type of activity, the organization/location, group size and hours devoted to the activity either on or off duty. See Appendix nine for a sample report from one field facility for the quarter April-May-June, 1983. Please note in the sample - yet mythical - report that there is a wide variety of types of aviation education activity illustrated. Note, too, that there is a wide range of schools and organizations represented. These are fairly typical and, if anything, would tend to be just a small sample of the groups an FAA Facilitator would be working with in the course of a year.

EDUCATING AND TRAINING AVIATION EDUCATION FACILITATORS

The major question facing any FAA facility manager is how do we motivate, educate, train, orient employees so they may function effectively and with confidence as Aviation Education Facilitators?

Fortunately, FAA has had considerable successful experience in accomplishing this task. Nearly every region of FAA has, during the past eight years, conducted one or more Aviation Education Facilitator Workshops. In a few instances where the region did not conduct such a project, they had observer-participants in one at a nearby region. Thus, this technique has been tested, and it works.

WORKSHOP OBJECTIVES

Each region must identify and decide what the regional community and individual facilitators' needs are in planning an effective workshop. There are differences from one region to another. However, all regions will need to consider providing their facilitators with:

- information such as in this publication, i.e. policies, etc.
- examples of how to work with educators and community organizations.
- support that is available.
- confidence-building experiences.

There have been successful one to three-day Aviation Education Facilitator Workshops. Under the best circumstances it is suggested that a three-day format be used. However, examples are provided for a one-day, two-day or three-day program.

The most important single ingredient for success of such a workshop is a positive supportive attitude on the part of the FAA Facility manager or supervisor. Employees need to know that their superior is fully behind the project. Next in importance is recruitment of volunteers to participate in the program. They should know that they are being trained to carry on certain Aviation Education Program functions for their facility and that this is part of a program consistent with both FAA's statutory mandate and the Administrator's policy.

The dates for such a workshop are important because of FAA workload and the availability of local educators and other community groups to participate. For example, July and August ordinarily would not be an ideal time for educators.

Major holiday months, such as Thanksgiving, Christmas, Yom Kippur, should be considered before scheduling such an event. Also, plans should be made so that participants will have an opportunity to use their experiences with local schools soon after the workshop. Thus,

if the workshop is held in June and schools are closed in July and August, the participants may lose some of the motivation for prompt application of the experiences gained. In any event, planning the dates for a Facilitator Workshop requires coordination with those concerned including resource personnel from outside FAA who may be invited to participate.

What performance objectives should a graduate of an Aviation Education Facilitator's Workshop be able to demonstrate?

Those completing a carefully planned and conducted workshop should be able to:

- **describe FAA's Aviation Education Program policy and goals.**
- **describe existing aviation education programs in schools and colleges in the area.**
- **identify a variety of aviation education resources.**
- **describe ways a Facilitator may be of assistance to educators.**
- **demonstrate how to assist schools in imoroving existing programs and in developing new ones, including career education activities.**
- **design a preliminary action plan for carrying out Aviation Education Program activities in accordance with FAA guidelines.**

One of the primary reasons why Aviation Education Facilitator Workshops are so important to FAA's mission attainment was spelled out in a research paper by H. Gene Little, then of the FAA, in 1977. Little stated in part:

> "One premise of the Aviation Education Program is that an informed citizenry makes better decisions based on knowledge than on ignorance. The career, political, economic and social implications of aviation and air transportation are well known to the industry, barely known by our fellow citizens, and perhaps even less understood by our educators. Thus, where schools want to improve their educational systems using aviation education, resource persons, in the role of facilitators, will be available to make a significant contribution."

For an example of a suggested one-day Aviation Education Facilitators Workshop see Appendix ten. This represents a minimum amount of time and will require compressing certain functions and eliminating others.

Appendix eleven includes what is considered to be an optimum time which is three days.

The key point to remember is that in either a one, two or three-day workshop, there are many resources available both within FAA and from other resources including government agencies, industry, educators and various aviation-oriented organizations. Past experience has shown that a well-planned Facilitator Workshop will pay huge dividends in creating a pool of motivated, dedicated FAA Aviation Education Facilitators.

A FINAL WORD

As you embark on your responsibilities as an FAA Aviation Education Facilitator, please realize that there are long and historically-significant precedents for what you will be doing. Furthermore, you have the support and encouragement of the Congress of the United States. FAA Administrator J. Lynn Helms has made a clear and firm policy statement on aviation education. Finally, the message from President Ronald Reagan dated July 8, 1983 to the World Congress on Aerospace Education meeting in Washington, D.C. states in part:

> "Your conference theme, 'Aviation and Space Education in Service to Mankind,' signals the importance of aerospace education, and, of course, we in the United States are fully supportive of it.
>
> Aviation and space technologies have unlimited potential not only for meeting industrial, commercial, and leisure needs, but, also, for offering insights and solutions to scientific problems and challenges. By expanding our knowledge and understanding, aerospace education can extend our reach and inspire our young people, the builders and inventors of the future."

Can you be less than "fully supportive" of FAA's Aviation Education Program?

APPENDIX ONE

THE SCOPE OF AEROSPACE

ENVIRONMENT

The Earth must be considered the basic reference point for all flight with its mantle of atmosphere thinning into the vacuum of endless space as the realm of aerospace flight.

EARTH

Our planet's basic characteristics form our standards of time, distance, and magnitude; and determine the perimeters of our understanding of the universe.

- Basic characteristics
- Reference system
- Earth-Moon relationship

AEROSPACE

The aerospace realm is divided and subdivided into many regions depending upon a particular disciplinary viewpoint. Flight through the atmosphere and in space are quite distinct with a merging of the two in a zone that has some of the environmental characteristics of both.

- Atmosphere (0-70,000 ft.)
  - structure
  - composition
  - phenomena
- Transition zone (70,000 ft.—50 miles)
- Space (beyond 50 miles)
  - structure
    - weather
    - jet streams
    - earth
    - solar system
    - stars
    - galaxies
    - universe
    - regions of space
  - Near Earth-Space Phenomena
    - meteoroids
    - radiation
    - "space weather"

Phenomena of Near-Earth Space. The venture into space resulted in the discerning of many phenomena. These phenomena are sometimes called weather of space and must be considered in planning spaceflight, much the same as in atmospheric flight.

Air
Air masses
Asteroids
Astrogeology
Astronomy
Atmosphere
Aurora
Aviation weather
Barometric pressure
Celestial sphere
Clouds
Comets
Constellations
Convection currents
Cosmic rays
Density altitude
Earth
Eclipse
Escape velocity
Evaporation & condensation
Fog
Galaxies
Gravity
Greenhouse effect
Humidity
Jupiter
Latitude & longitude
Lightning
Mercury
Meteors
Moon
Neptune
Planets
Pluto
Precipitation
Quasar
Radiation
Solar system
Space weather
Stars
Sun
Turbulence
Ultraviolet
Universe
Van Allen belts
Venus
Weather
Wind

BASIC SCIENCES IN AEROSPACE

The basic sciences underlie all the activities of aerospace. They are often applied in new and unconventional ways and have forced the emergence of obscure branches of a basic science into surprising prominence, even to the point of creating new career fields. One interesting example is cryogenics.

- Astronomy
- Biology
- Chemistry
- Earth sciences
- Electricity and electronics
- Flight sciences
  - aerodynamics
  - astrodynamics
- Meteorology *
- Nuclear physics
- Physics
  - electromagnetism
  - heat
  - mechanics

*note: Meteorology is separated from Earth sciences because of its significance to aeronautical operations.

Acoustics
Airfoil
Astrophysics
Atoms
Bernoulli's principle
Binary numbers
Bird flight
Boyle's law
Celestial mechanics
Chemical energy
Cryogenics
Crystallography
Doppler effect
Dynamic soaring
Elements
Energy
Extraterrestrial life
Fluid mechanics
Gases
Heat energy
Infrared radiation
Lasers
Light
Matter
Measurement of power
Metals and metallurgy
Newton's laws
Noise
Nuclear energy
Orbits and trajectories
Parabola
Photosynthesis
Plasma
Quantum theory
Radio astronomy
Relativity theory
Semiconductors
Shock waves
Solar cells
Solid-state physics
Space biology
Spaceflight principles
Temperature scales
X-rays

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MAN IN FLIGHT (AEROSPACE MEDICINE)

Man has a very limited ability to adapt to the changing conditions as he flies higher and faster into an increasingly hostile environment which quickly requires a self-contained, artificially created atmosphere to sustain life.

- Medical Aspects
  - Physiological factors
  - Psychological factors
  - Circadian rhythms
- Pilot and astronaut qualifications
- Preparatory training
  - Acclimation
  - Simulators
  - Survival training
- Food and nutrition
- Environmental protection and control
  - Clothing & equipment
  - Escape systems
  - Emergency systems
  - Vehicle design
  - Human engineering

Acceleration
Aerospace medicine
Animals in space
Apollo
Astronauts
Aviation medicine
Bends
Biosatellites
Circadian rhythm
Closed ecological system
Cosmonauts
Crash investigation
Cybernetics
Decompression
Drug effects
Environmental control systems
Environmental simulators
Escape systems
Flight (as passenger)
Flight physical
Flight simulators
Food and nutrition
Gemini
High-altitude flight training
Human engineering
Hydroponics
Hypoxia
Interplanetary travel
Life-support systems
Man in flight
Manned spaceflight
Mercury program
Parachutes
Pilots and pilot certificates
Pressurization
Psychological factors of flight
Sensory deprivation
Space biology
Spaceflight training
Space medicine
Spacesuits
Technological projections
Temperature control
Walk in space
Weightlessness

PEOPLE and EVENTS IN DEVELOPMENT OF AEROSPACE

Modern aerospace has its roots in mythology and legend; however, its role as a meaningful part of our society has only developed during the past few decades.

- Significant contributors
- Pioneering organizations
- Records and achievements
- Mythology and legend
- Major eras
  - Pre-powered flight
  - Pre-WWI
  - WWI
  - Between wars
  - WWII
  - Post WWII
  - Future

Ace
Airmail
Altitude records
Balloons
Barnstormers
Battle of Britain
Berlin Airlift
Biographies
Commercial airlines
Da Vinci, Leonardo
Distance records
Endurance records
First World War aircraft
Flying Circus
International Geophysical Year
International Years of the Quiet Sun
Israeli-Arab Conflict—1967
Kamikaze
Korean War
Luftwaffe
Man-powered flight
Medals and decorations
Military aviation
Mythology
National Advisory Council for Aeronautics
Peenemuende
Rheims Air Meet
Rockets and rocketry
Science fiction
Speed records
Trophies and awards
Women in aerospace
World War I
World War II

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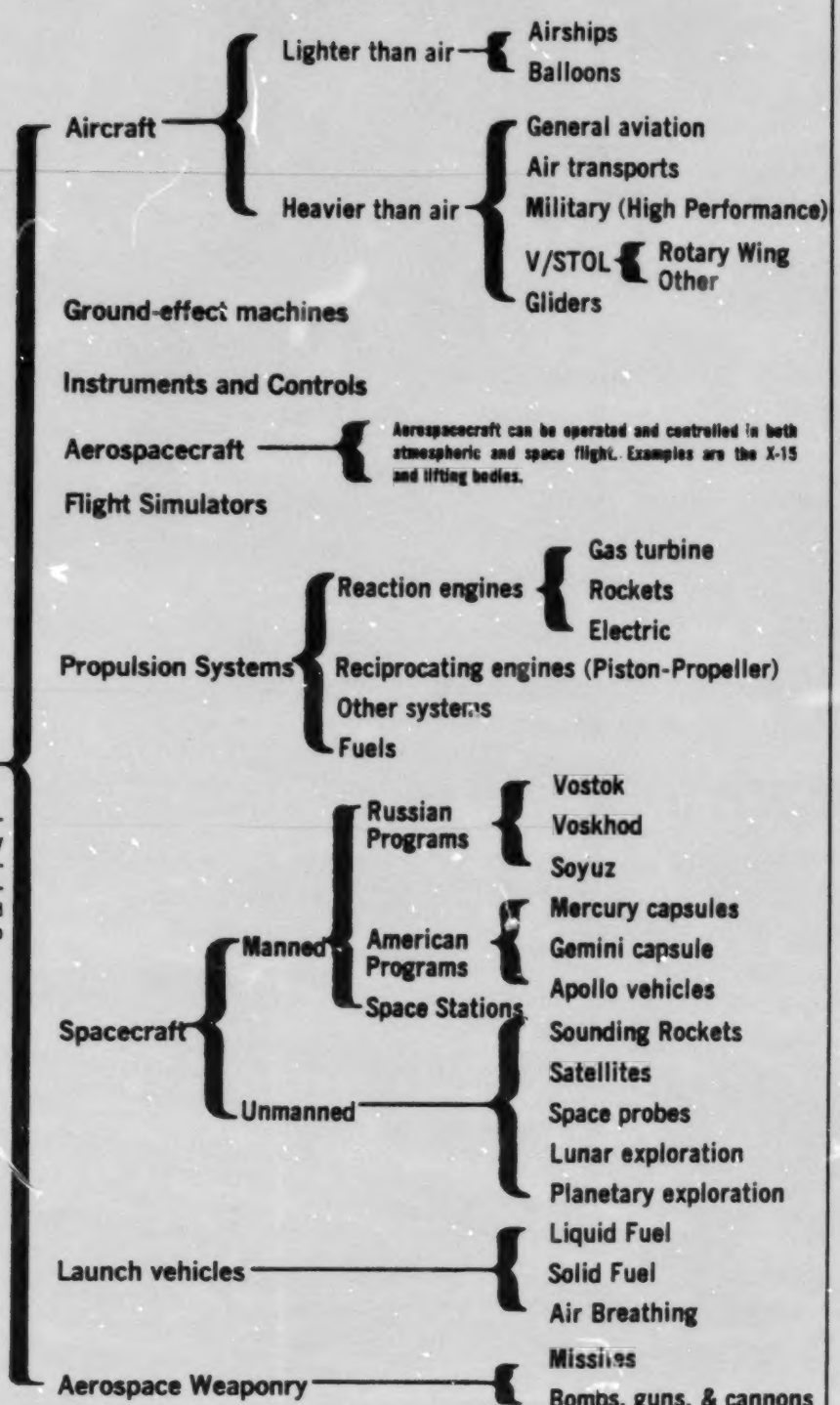
Aerospace Education Defined



Aircraft propulsion systems
Airplane
Airships
Airspeed indicator
Apollo
Applications Technology Satellites
Area rule
Atlas missile
Autogiros
Balloons
Bomber aircraft
Bombs
Carburetion
Cargo aircraft
Center of gravity
Commercial air transports
Communications satellites
Dirigibles
Engines
Fighter aircraft
Flight simulators
Fuels
Gas turbine engines
Gemini
General aviation aircraft
Generators and alternators
Gliders
Ground-effect machines
Heat shields
Helicopters
High-lift devices
Homebuilt aircraft
Hydraulic systems
Hypersonic flight
Instrument panel
Interiors of aircraft
Jet aircraft
Jumbo jets
Kites
Kosmos satellites
Launch vehicles
Lubricants
Manned Orbiting Laboratory
Mercury program
Missiles
Model aircraft
Nuclear propulsion
Pitot-static system
Propellants
Ranger
Reciprocating engines
Reconnaissance satellites
Re-entry vehicles
Rebets
Rockets and rocketry
Rotating combustion engines
Sailplanes
Satellites
Saturn rockets
Second World War aircraft
Solar cells
Sounding rockets
Spacecraft design
Space propulsion systems
Space stations
Supersonic flight
Supersonic transports
Surveyor
Temperature control
V/STOL aircraft
Weaponry
Weather satellites
Wings
X-series aircraft

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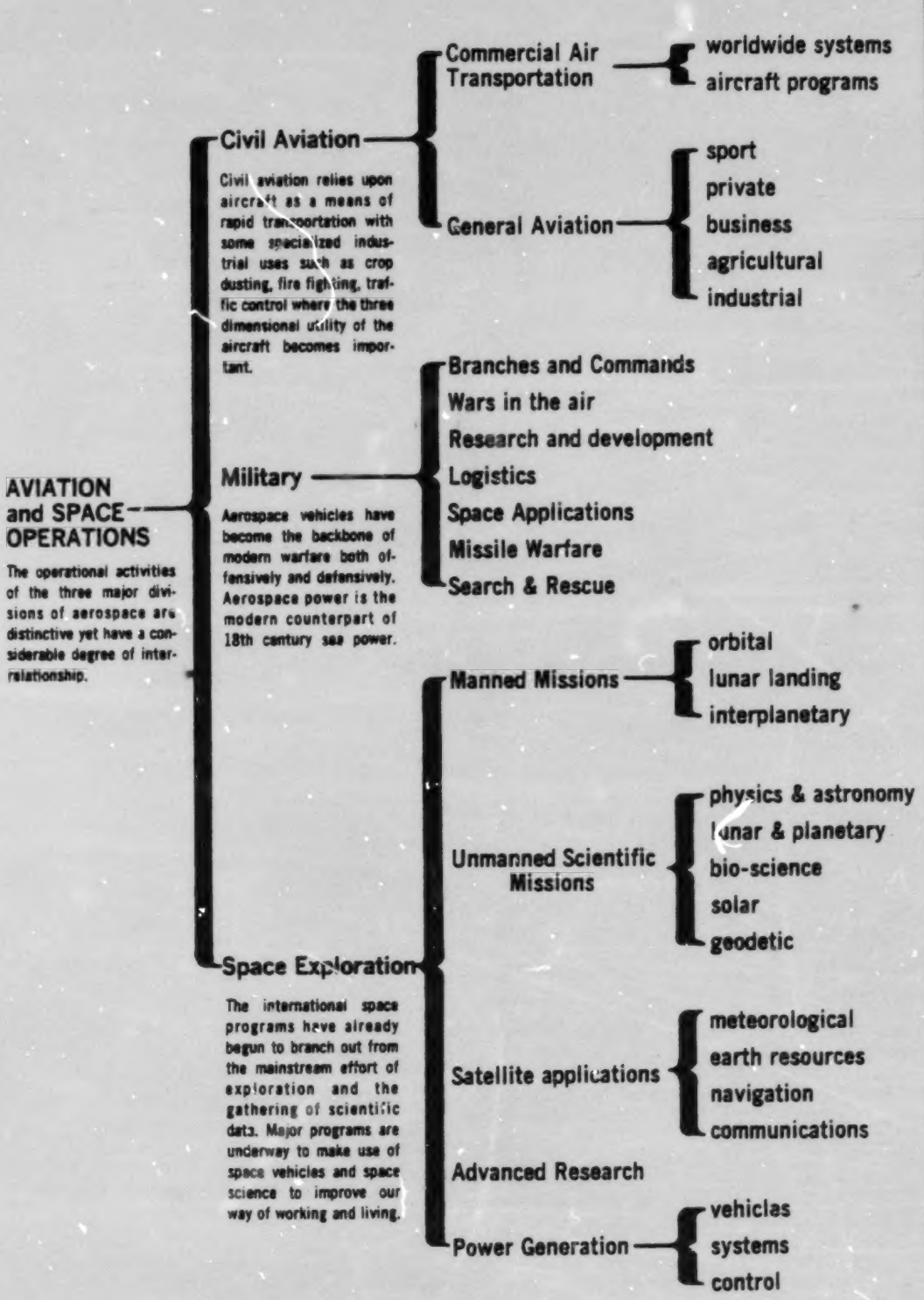
AVIATION and SPACE OPERATIONS
The operational activities of the three major divisions of aerospace are distinctive yet have a considerable degree of interrelationship.
Civil Aviation
Civil aviation relies upon aircraft as a means of rapid transportation with some specialized industrial uses such as crop dusting, fire fighting, traffic control where the three dimensional utility of the aircraft becomes important.
Commercial Air Transportation
worldwide systems
aircraft programs
General Aviation
sport
private
business
agricultural
industrial
Military
Aerospace vehicles have become the backbone of modern warfare both offensively and defensively. Aerospace power is the modern counterpart of 18th century sea power.
Branches and Commands
Wars in the air
Research and development
Logistics
Space Applications
Missile Warfare
Search & Rescue
Space Exploration
The international space programs have already begun to branch out from the mainstream effort of exploration and the gathering of scientific data. Major programs are underway to make use of space vehicles and space science to improve our way of working and living.
Manned Missions
orbital
lunar landing
interplanetary
Unmanned Scientific Missions
physics & astronomy
lunar & planetary
bio-science
solar
geodetic
Satellite applications
meteorological
earth resources
navigation
communications
Advanced Research
Power Generation
vehicles
systems
control

Aerial photography
Agricultural aviation
Air defense systems
Air forces of the world
Air raid
Air traffic control
Air taxis
Apollo
Applications Technology Satellites
Army aviation
Bush flying
Business aviation
Charter flying
Coast Guard aviation
Commercial airlines
Communications satellites
Cloud seeding
Crash investigation
Crop dusting
Demonstration teams
DEW line
Discoverer
Environmental research satellites
European aerospace activities
Explorer satellites
Fighter aircraft
Flight (as passenger)
Flight test programs
Flying doctor services
Forest fire control
Gemini
General aviation
Geodetic satellites
Gliding
International Flying Farmers
Interplanetary travel
Launching
Lunar exploration
Manned spaceflight
Marine Corps aviation
Mariner probes
Mercury program
Military aviation
Military space program
Mountain, desert, and jungle flying
Naval aviation
Navigation satellites
NORAD
Oceanographic research
Orbiting observatories
Photography
Photogrammetry
Polar flights
Police and fire services
Preventive maintenance
Reconnaissance
Re-entry vehicles
Refueling
Rendezvous and docking
Rockets and rocketry
Rescue and recovery service
Search and rescue
Sport flying
Strategic Air Command
Technological projections
Telescopes
U.S. Air Force
U.S.S.R aerospace activities
Utility aviation

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THE ART and TECHNIQUES OF FLIGHT

Aeronautical skills have grown from the trial and error techniques of pioneering aviators to precise control of today's sophisticated aircraft. The term "interface" has been coined to describe the interrelationship of a man, with his knowledge and capability, and the functioning of his vehicles. The two are a functioning unit. Astronautics and aeronautics form a continuum. Conceptually, navigation, communications, environmental control, instrumentation, etc., are similar in both; but the degree of advancement and sophistication in astronautics is considerable.

- **Aviation Weather** — Should be distinguished from meteorology as the reporting, interpretation and evaluation of weather relating to the use of aircraft.
- **Aeronautical skills**
  - Pilot training
  - Flight technique and management
  - Navigation
  - Maneuvers
  - Flight planning
- **Astronautical skills**
  - Astronaut training
  - Mission simulation
  - Mission planning
  - Mission activities
- **Aids to flight**
  - Maps and charts
  - Pilot equipment
  - Manuals
  - Reference materials
- **Related activities**
  - Test piloting
  - Aerobatics
  - Exhibition and demonstration flying
  - Skydiving

Aviation weather
Bank
Bush flying
Celestial navigation
Charts
Compasses
Course plotting
Dead reckoning
Flight computers
Flight instruction
Flight management
Flight plan
Flying safety
High-altitude flight training
Instrument flight techniques
Lunar charts
Magnetic course
Maneuvers
Maps and mapping
Mountain, desert, and jungle flying
Navigation techniques
Pilotage
Pilot and crew wings
Pilots and pilot certificates
Pilot training
Power management
Preflight training
Spaceflight principles
Test pilots and test flying
Weather maps and charts
Weight and balance

COMMUNICATIONS and CONTROL

The expanding use of aircraft coupled with their increasing speeds and flight capability require an air traffic control system which can provide precise inflight and terminal area guidance. This task would be hopeless without the aid of electronics. The enormous capacity of electronic computers is becoming increasingly vital to the process of keeping man ahead of his inflight machines.

Spaceflight presents far more sophisticated problems in communications and control related to the precision maneuvers required and the sheer magnitude of speeds and distances encountered. Without advanced electronics interfaced with computers, today's spaceflight programs would be virtually impossible.

- **Aviation**
  - Avionics
  - Air Traffic Control
  - National Airspace System
- **Radar**
- **Radio Communications**
- **Data Acquisition**
- **Space**
  - Astrionics
  - Tracking system
  - Guidance and Command
- **Cybernetics**
  - Science of Control and Communication Processes in Man and Machines

Air traffic control
Attitude control
Automatic landing
Avionics
Bearing
Communications satellites
Computers
Cybernetics
Data acquisition and processing
Doppler navigation
Electronics
Electromagnetism
Flight plan
Ground control approach
Guidance and control systems
Gyroscope
Inertial guidance
Information systems
Instrument Flight Rules
Lasers
Microwave
Morse code
National Airspace System
Navigation systems
Navigation satellites
Phonetic alphabet
Radar
Radio
Radio communications
Spaceflight principles
Telemetry
Television
Tracking systems and networks
Visual Flight Rules

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MANUFACTURING and FACILITIES

A vast industrial complex is necessary to support the research, development, and manufacture of aerospace craft. The functional use of these vehicles is dependent upon complex worldwide supporting facilities.

- Civil Aviation
  - airports
  - terminals
  - surface transportation
- Military Aerospace Facilities
  - air bases
  - aircraft carriers
  - air defense command networks
  - launch sites
- Space flight facilities
  - launch complexes
  - control and support centers
  - observatories
- Industry
  - manufacturing
  - research & development
  - materials
- Research, Development, and Testing
  - wind tunnels
  - test sites
  - research centers

Aeronautical Center (FAA)
Aerospace industry
Aircraft carriers
Airports
Alloys
Blockhouse
Certification procedures
Computers
DEW line
Environmental simulators
Fabrics
Fixed base operation
Flight service stations
Ground antennas
Ground service and maintenance
Hangars
Heliports
High-speed surface transportation
Interiors of aircraft
Kennedy Space Center
Launch facilities
Lunar bases
Manufacturing
Materials
Metals and metallurgy
Observatories
Planetariums
Production techniques
Program management
Refueling
Runways
Testing
Wind tunnels

AEROSPACE and SOCIETY

The technological achievements of aerospace must be viewed in the context of involvement and effect upon the world society to be understood in proper prospective.

- Implications
  - Social
  - Economic
  - Political
  - Legal
  - Educational
  - Career Opportunities
- Societies, Organizations and Associations Aerospace Industry
- Government Involvement
  - United States
    - Government promotion
      - a) military
      - b) NASA
      - c) airports
      - d) National Airspace System
    - Government Regulation
      - a) aviation and space law
      - b) Federal aviation regulations
      - c) economic
      - d) state
      - e) local
  - United Nation and International Agreements
  - Foreign Nations
    - civilian
    - military
    - space programs

Air Commerce Act
Australia's aviation
Careers
Civil Aeronautics Board
Commemorative stamps and medals
Crash investigation
Economic implications
Educational implications
European
FAA
FAI
FAR
Five Freedoms
Government contracts
Government in aerospace
Information systems
Insignia
Insurance
International agreements
International Agricultural Aviation Centre
International Flying Farmers
Legal implications
Military implications
NASA
Objects of art
Occupations
Patents
Pilots and pilot certificates
Political implications
Program management
Registration of aircraft
Safety statistics
Social implications
Space law
Stewards and stewardesses
Systems engineering
Technological projections
Terminology of aerospace
UFO's

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APPENDIX TWO

AEROSPACE COURSE POSSIBILITIES

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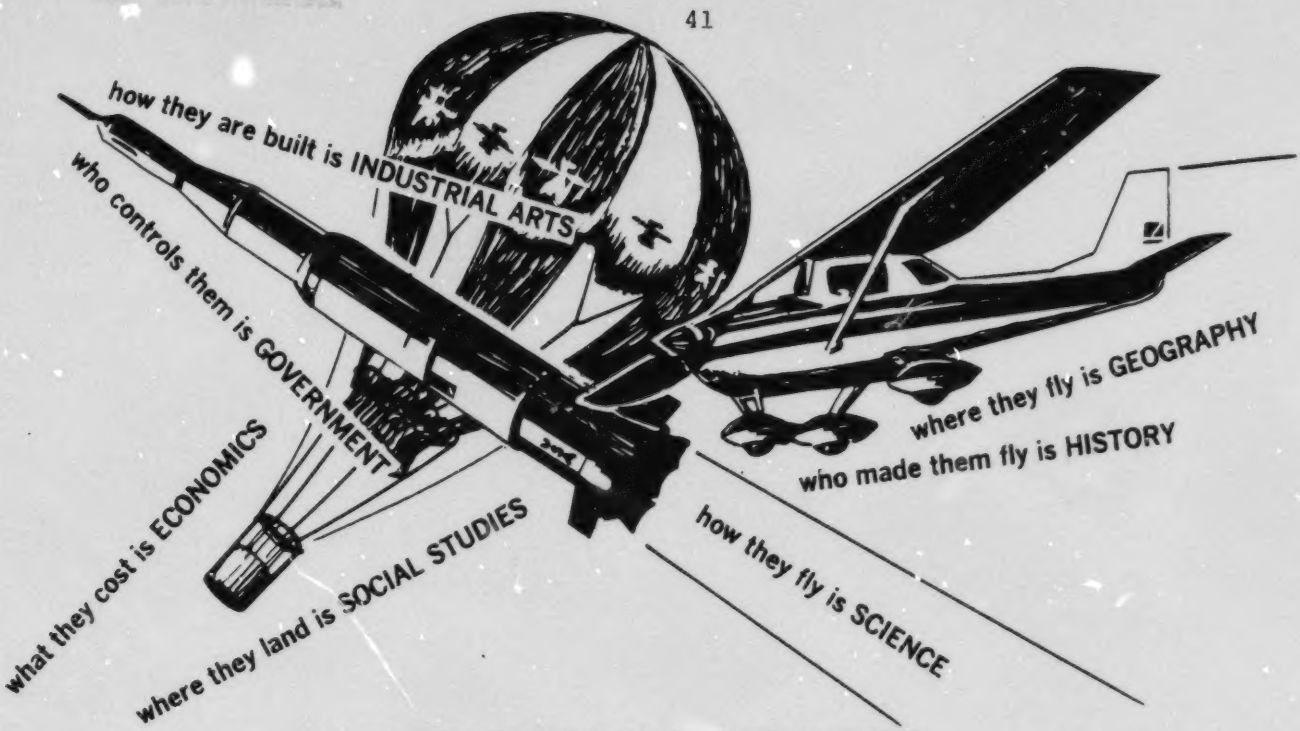
how they are built is INDUSTRIAL ARTS
who controls them is GOVERNMENT
what they cost is ECONOMICS
where they land is SOCIAL STUDIES
how they fly is SCIENCE
where they fly is GEOGRAPHY
who made them fly is HISTORY

SELECTED AEROSPACE TOPICS IN CURRICULUM CONTEXT

AGRICULTURE

Aerial photography
Agricultural aviation
Australia's aviation
Crop dusting
Cloud seeding
Economic implications
Food and nutrition
Infrared radiation
International Agricultural Aviation Centre
International Flying Farmers
Photosynthesis
Weather
Weather satellites

ART

Balloons
Commemorative stamps and medals
Da Vinci, Leonardo
History of aviation
Insignia
Interiors of aircraft
Kites
Medals and decorations
Model aircraft
Mythology
Objects of art
Photography
Pilot and crew wings
Science fiction
Trophies and awards

ASTRONOMY

Asteroids
Astronautics
Astronomy
Astrophysics
Celestial mechanics
Celestial sphere
Comets
Constellations
Cosmic rays
Eclipse
Galaxies
International Years of the Quiet Sun
Interplanetary travel
Kepler's laws
Light
Mariner probes
Meteors
Moon
Observatories
Orbiting observatories
Orbits and trajectories
Planetariums
Planets
Quantum theory
Quasar
Radio astronomy
Relativity theory
Solar system
Stars
Sun
Telescopes
Ultraviolet
Universe
X-rays

BIOLOGY

Animals in space
Aviation medicine
Biosatellites
Bird flight
Circadian rhythm
Closed ecological system
Extraterrestrial life
Hydroponics
Kosmos satellites
Photosynthesis
Space biology

BUSINESS LAW

Airports
Certification procedures
Civil Aeronautics Board
Crash investigation
Government contracts
Insurance
Legal implications
Patents
Police and fire services
Registration of aircraft

CAREER GUIDANCE

Air traffic control
Army aviation
Astronauts
Careers
Charter flying
Cryogenics
Crystallography
Cybernetics
Flight instruction
General aviation
Government in aerospace
Ground service and maintenance
Manufacturing
Occupations
Pilots and pilot certificates
Pilot training
Spacecraft design
Stewards and stewardesses
Test pilots
Women in aerospace

CHEMISTRY

Air
Alloys
Atoms
Atmosphere
Chemical energy
Closed ecological system
Cryogenics
Elements
Fuels
Gases
Lubricants
Propellants
Specific gravity

EARTH SCIENCE

Air masses
Applications Technology Satellites
Astrogeology
Astronautics
Astronomy
Astrophysics
Atmosphere
Aurora
Aviation weather
Boyle's law
Charts
Compasses
Density altitude
Discoverer program
Earth
Environmental research satellites
Explorer satellites
Geodetic satellites
Gravity
Greenhouse effect
Kosmos satellites
Latitude and longitude
Lightning
Lunar charts
Magnetic course
Maps and mapping
Mariner probes
Meteorology
Navigation systems
Navigation techniques
Oceanographic research
Orbiting observatories
Pilotage
Precipitation
Ranger
Sounding rockets
Surveyor
Van Allen belts
Weather
Weather maps and charts
Weather satellites

ECONOMICS

Aerospace industry
Airports
Bush flying
Business aviation
Cargo aircraft
Commercial airlines
Commercial air transports
Crop dusting
Economic implications
Fixed base operator
Flight simulators
General aviation
Government contracts
Government in aerospace
Jet aircraft
Jumbo jets
Manufacturing
Production techniques
Program management
Supersonic transports
Utility aviation

GENERAL SCIENCE

Airplane
Astronomy
Atmosphere
Atoms
Barometric pressure
Bernoulli's principle
Bird flight
Clouds
Electricity
Energy
Engines
Fog
Galaxies
Helicopters
Jet aircraft
Launch vehicles
Man in flight
Matter
Mercury program
Photography
Planets
Radio communications
Satellites
Saturn rockets
Space stations
Stars
Sun
Walk in space
Weather
Weather satellites

GEOGRAPHY

Bush flying
Cartography
Charts
Compasses
Course plotting
European aerospace activities

Latitude and longitude
Magnetic course
Maps and mapping
Photography
Photogrammetry
U.S.S.R. aerospace activities

GEOLOGY

Astrogeology
Geodetic satellites
Mountain, desert, and jungle flying
Photogrammetry
Ranger
Surveyor

GOVERNMENT

Aerospace industry
Air Commerce Act
Air traffic control
Apollo
Army aviation
Civil Aeronautics Board
Coast Guard aviation
Crash investigation
FAA
Federal Aviation Regulations
Flight service station
Government contracts
Instrument Flight Rules
Marine Corps aviation
Mercury program
Military aviation
Military space program
NASA
National Airspace System
Naval aviation
Pilots and pilot certificates
Registration of aircraft
Visual Flight Rules

HEALTH

Aerospace medicine
Animals in space
Astronauts
Circadian rhythm
Drug effects
Environmental control systems
Flight physical
Food and nutrition
Human engineering
Hypoxia
Life-support systems
Man in flight
Manned spaceflight
Man-powered flight
Pressurization
Sensory deprivation
Spacesuits
Temperature control
Weightlessness

HISTORY

Aces
Air Commerce Act
Air raid
Altitude records
Autogiros
Balloons
Barnstormers
Battle of Britain
Biographies
Bomber aircraft
Bush flying
Commemorative stamps and medals
Dirigibles
Distance records
Endurance records
First World War aircraft
Flying Circus
Gliders
History of aviation
Korean War
Luftwaffe
Man-powered flight
Mythology
National Advisory Committee for Aeronautics
Rheims Air Meet
Science fiction
Second World War aircraft
Speed records
Women in aerospace
World War I
World War II

HOME ECONOMICS

Fabrics
Food and nutrition
Interiors of aircraft
Spacesuits
Stewards and stewardesses

INDUSTRIAL ARTS

Aerial photography
Aircraft propulsion systems
Avionics
Electronics
General aviation aircraft
Generators and alternators
Interiors of aircraft
Manufacturing
Materials
Metals and metallurgy
Occupations
Preventive maintenance
Production techniques
Refueling
Spacecraft design

INTERNATIONAL RELATIONS

Air defense systems
Air forces of the world
Berlin airlift
Commercial airlines
DEW line
Federation Aeronautique Internationale
Five Freedoms
International agreements
International Geophysical Year
International projects
Israeli-Arab Conflict 1967
Missiles
Political implications
Reconnaissance
Space law
Tracking systems and networks
United Nations

MATHEMATICS

Binary numbers
Celestial navigation
Course plotting
Cybernetics
Dead reckoning
Doppler navigation
Escape velocity
Information systems
Navigation techniques
Orbits and trajectories
Parabola
Telemetry
Weight and balance

MEDICINE

Accelaration
Aerospace medicine
Animals in space
Astronauts
Aviation medicine
Circadian rhythm
Closed ecological system
Decompression
Drug effects
Environmental control systems
Environmental simulators
Escape systems
Flight physical
High-altitude flight training
Human engineering
Hypoxia
Life-support systems
Man in flight
Manned spaceflight
Mercury program
Parachutes
Pressurization
Psychological factors of flight
Re-entry vehicles
Sensory deprivation
Space biology
Spaceflight training
Space medicine
Spacesuits
Technological projections
Walk in Space
Weightlessness
X-rays

METEOROLOGY

Air
Air masses
Atmosphere
Barometric pressure
Clouds
Convection currents
Earth science
Evaporation and condensation
Fog
Humidity
Precipitation
Turbulence
Weather maps and charts
Weather satellites
Wind

PHYSICS

Acoustics
Aerodynamics
Aircraft propulsion systems
Airfoil
Airplane
Airspeed indicator
Alloys
Area rule
Astronautics
Attitude control
Automatic landing
Avionics
Bank
Bearing
Bernoulli's principle
Boyle's law
Carburetion
Center of gravity
Computers
Cryogenics
Crystallography
Doppler effect
Dynamic soaring
Electricity
Electromagnetism
Electronics
Energy
Engines
Escape velocity
Flight management
Fluid mechanics
Gas turbine engines
Ground-effect machines
Gyroscope
Heat energy
Heat shields
High-lift devices
Hydraulic systems
Hypersonic flight
Inertial guidance
Infrared radiation
Instrument panel
Lasers
Launching
Lifting-body vehicles
Maneuvers
Matter
Measurement of power
Metals and metallurgy
Newton's laws
Noise
Nuclear energy
Nuclear propulsion
Pitot-static system
Plasma
Power management
Radar
Radiation
Radio
Reciprocating engines
Rendezvous and docking
Robots
Rotating combustion engines
Sailplanes
Semiconductors
Shock wave
Solar cells
Solid-state physics
Space propulsion systems
Supersonic flight
Television
Temperature scales
V/STOL aircraft
Wind tunnels
Wings
X-rays

PSYCHOLOGY

Astronauts
Aviation medicine
Cosmonauts
Flying safety
Gemini
Man in flight
Pilot training
Psychological factors of flight
Spaceflight training
Space medicine

SOCIAL STUDIES

Air defense systems
Air forces of the world
Airmail
Air taxis
Apollo
Army aviation
Atlas missile
Berlin airlift
Biographies
Blockhouse
Bombs
Careers
Cargo aircraft
Commercial airlines
Communications satellites
Crop dusting
Cybernetics
Demonstration teams
DEW line
Economic implications
Educational implications
Eurospace
European aerospace activities
Fighter aircraft
Fixed base operation
Flight (as passenger)
Flight test programs
Flying doctor services
Forest fire control
Gemini
General aviation
Gliders
Gliding
Government in aerospace
Hangars
Helicopters
Heliports
High-speed surface transportation
History of aviation
Homebuilt aircraft
Instrument flight techniques
Insurance
Interplanetary travel
Israeli-Arab Conflict—1967
Jet aircraft
Jumbo jets
Kamikaze
Kennedy Space Center
Korean War
Launch facilities
Launch vehicles
Luftwaffe
Lunar bases
Lunar exploration
Manned Orbiting Laboratory
Manned spaceflight
Manufacturing
Mercury program
Military aircraft
Military implications
Military space program
Missiles
Mythology
NASA
Naval aviation
NORAD
Oceanographic research
Peenemuende
Polar flights
Police and fire services
Preflight training
Production techniques
Program management
Radio communications
Rescue and recovery service
Rockets and rocketry
Runways
Safety statistics
Sailplanes
Satellites
Saturn rockets
Search and rescue
Social implications
Space stations
Sport flying
Strategic Air Command
Supersonic transports
Systems engineering
Technological projections
Unidentified flying objects
U.S.S.R. aerospace activities
Utility aviation
Weaponry
Wind tunnels
X-series aircraft

SPEECH AND COMMUNICATIONS

Air traffic control
Communications satellites
Ground control approach
Morse code
Phonetic alphabet
Terminology of aerospace

BEST COPY AVAILABLE

APPENDIX THREE

GUIDE TO FAA AVIATION EDUCATION SUPPLEMENTARY MATERIALS

FEDERAL AVIATION ADMINISTRATION

Guide to FAA Aviation Education Supplementary Materials

for use by

REGIONAL AVIATION EDUCATION COORDINATORS

FAA LOCAL COORDINATORS & FACILITATORS

Office of Public Affairs
Aviation Education, APA-5
1983

PRIMARY LEVEL

(GRADES KINDERGARTEN - THREE)

CURRICULAR AREAS	SKILLS & CONCEPTS	*RECOMMENDED FAA MATERIAL
COGNITIVE:		
Language & Communication	Vocabulary, Reading, Writing, Listening, Telling Stories, Speaking	"Trip to the Airport: Un Viaje Al Aeropuerto" GA-300-121
Social Studies	Transportation, Airports, Community Helpers, Going Places, Hauling & Carrying Things, Kinds of Aircraft, Role Models	"August Martin Activities Book"
Science & Math	Air in Motion, Clouds, What Makes an Airplane Fly, Things That Fly in the Air	"Aviation Science Activities for Elementary Grades" GA-200-30
PSYCHO-MOTOR:		
Hand & Eye Coordination	Model Building, Folding Airplanes, Drawing, Group Construction Activity Individual Activity	"Teachers' Guide to Aviation Education Grades Two-Six"
AFFECTIVE:		
Art & Music	Songs, Art Activities, Simple Dances	*All the materials listed above can apply to each cognitive area. Suggestions for psycho-motor and affective skills are also offered.

INTERMEDIATE LEVEL

(GRADES FOUR-SIX)

CURRICULAR AREAS	SKILLS & CONCEPTS	RECOMMENDED FAA MATERIAL
COGNITIVE:		
Language & Communication	Vocabulary, Reading, Writing, Listening, Speaking, Research, Creative Writing.	"Teachers' Guide to Aviation Education" GA-300-135 "August Martin Activities Book" GA-300-143A
Social Studies	Geography: Map Skills, Navigation, Air Routes, Air Traffic Control. History: Transportation development, Significant Events, Heroes, Aircraft, Technology. Economics: Commercial Uses of Aircraft, Role of Airports, Federal Air Regulations, Role of Government in Aviation.	"Teachers' Guide to Aviation Education" GA-300-135 *"Safety in the Air"
Science & Math	Atmosphere, Air, Weather, Clouds, What Makes An Airplane Fly, Parts of Airplanes, Basic Instruments, Data Gathering, Analysis, Drawing Conclusions, Observing, Classifying, Hot Air Balloons.	"Demonstration Aids for Aviation Education" GA-20-30B "Teachers' Guide to Aviation Education" GA-300-135 **"Aviation Science Activities for Elementary Grades" GA-20-30
Health & Safety	Health Standards for Pilots, Astronauts, Exercise and Physical Condition, Nutrition, Oxygen, Drug Abuse.	"Teachers' Guide to Aviation Education" GA-300-135
Career Awareness	Occupations in Air Transportation, General Requirements, Categories of Work.	"Teachers' Guide to Aviation Education" GA-300-135

* Projected for 1984

** Formerly, "Demonstration Aids for Aviation Education" GA-20-30

INTERMEDIATE LEVEL

(GRADES FOUR-SIX)

CONT'D

CURRICULAR AREAS	SKILLS & CONCEPTS	RECOMMENDED FAA MATERIAL
PSYCHO-MOTOR:	Building & Flying Paper and Model Aircraft. Hot Air and Helium-filled balloons. Wind Tunnels, Weather Stations, Group and Individual Construction Activity.	"Aviation Science Activities for Elementary Grades" GA-20-30 "Demonstration Aids for Aviation Education" GA-20-30B *"Air, Weather, and Flight" (Also for Science)
AFFECTIVE:	Artistic Expression, Design, Posters, Bulletin Boards, Book Covers, Art Exhibits, Drawing, Painting, Airplane Paint Designs Such as Airlines Use, Graphics. Architecture, Decor, Airport Terminals, Past and Present. Songs, Dances.	Many examples exist and can be obtained in local libraries, airlines, aircraft companies, students' own experiences.

* Projected for 1984

UPPER LEVEL

(GRADES SEVEN-NINE)

CURRICULAR AREAS	SKILLS & CONCEPTS	*RECOMMENDED FAA MATERIALS
COGNITIVE:		
Language & Communication	Functional & Creative Writing, Speaking Purposefully, Listening, Following Instructions, Research, Organizing Data, Library Skills, Reading for Information.	**"Aviation Curriculum Guide" **"Safety in the Air"
Social Studies & Careers	Contributions of Aviation to Progress, Correlation with Science of Navigation, Early-Modern History of Air Travel, Social, Economic Changes, Vocational Opportunities, International Character of Aviation.	"Career Pamphlets" ***"A Model Aerospace Curriculum" GA-300-143B
Science & Math	Navigation, Map Skills, Piloting, Principles of Flight, Scientific Investigation, Data Gathering and Analysis, Drawing Conclusions.	
Health & Safety	Taking Responsibility for One's Own Health, Diet, Exercise, Prevention of Drug Abuse.	
PSYCHO-MOTOR:		
	Building/Flying Models, Wind Tunnels, Weather Stations, Aircraft Design.	

* Most items listed are multi-disciplinary with applications in all curricular areas.

** Available in 1984.

*** Contains material for secondary level, but may be useful to upper grades teachers.

APPENDIX FOUR

PROJECT SCHOOLFLIGHT

PROJECT SCHOOLFLIGHT

Q. What is Project Schoolflight?

A. Project Schoo. light promotes the building of aircraft in high schools, vocational schools and universities. Clubs such as Explorer Scouts, Air Cadets, the Civil Air Patrol, and corrective insititutions also participate in the program.

Q. Who sponsors Project Schoolflight?

A. The EAA Aviation Foundation, Inc., is the organizer of Project Schoolflight. The mailing address is: EAA Aviation Foundation, Inc.
P.O. Box 469
Hales Corners,
Wisconsin 53130

Q. What is the purpose of Project Schoolflight?

A. Student motivation is the primary purpose, though there are others. Aviation classes have the ability to "turn students on" to education. It is found that Project Schoolflight students suddenly develop renewed interest in all their classes. These aviation classes have the tendency to reduce absenteeism, re-motivate the potential dropouts and inspire students to new and improved efforts in other academic subjects such as mathematics. In short, students attain better grades and have brighter outlooks for the future. Such projects, in many cases, have "closed the generation gap" between students and teachers.

Q. What are the educational objectives of Project Schoolflight?

A. Project Schoolflight teaches a variety of skills that few other programs can match. A list of these skills would include items such as: Blueprint ading, woodworking, welding, sheet metal work, use of templates and jigs, erial lists, quality control, inspections, fiberglass work, special crafting experience, covering techniques, painting and assembly, engine work, hydraulics, electrical systems, upholstery, instrument installations.

Pride in craftsmanship and an appreciation of actually creating an object for flight are primary goals of Project Schoolflight.

Q. Can any group of students develop the capacity to build an airplane?

A. Various classes have undertaken construction of an airplane. Those who have successfully built an airplane range from extremely gifted students in accelerated programs to handicapped children in special schools. With the proper motivation and expert instruction, just about any group of students can build an airplane.

Q. Does it require a special curriculum?

A. No. Aircraft building classes have succeeded in many classrooms. Usually, an aviation instructor gets involved through his regular courses; and many industrial arts teachers have started such classes. However, airplanes have been built in art classes, history classes, and even mathematics classes. The motivational value of the project has been recognized by many teachers outside the industrial arts curriculum. Curriculums that have been used successfully are available to be used as guides. They can be obtained from EAA Headquarters.

Q. What does Project Schoolflight produce?

A. The tangible product is a beautiful airplane built to the Experimental (amateur-built) category standards; but, more importantly, there is pride in craftsmanship for the student involved. Actually seeing the plane in flight (or flying in it!) is always a highpoint of this program.

Q. Who finances the building of the airplane?

A. One way is for the schools to finance the project. This insures that the profits from an aircraft sale are returned to the school. However, due to the many fine benefits the students experience through their participation on the project, sponsorship has also worked well. Outside sponsors can provide the materials while the students actually construct the plane. Some teachers have funded projects in this manner. One teacher had 12 airplanes built by students in the program. Potential sponsors' names are available through the EAA Aviation Foundation.

Q. What are the advantages to the school?

A. The renewed motivation of the students involved is often more than sufficient reward to many administrators. However, the airplane project soon becomes the "school project," and provides a definite boost to school pride. Also, this type of program makes news. Local TV and newspapers have shown a great deal of interest in participating schools. Many schools involved with the program have found it has improved public and community relations ... "That's the school that's building an airplane!" The type of foresight and determination required to initiate such a project is valued in today's society.

Q. What are the advantages to the teacher?

A. Teachers often report that there is improvement in teacher-student communication once a program is underway. Often teachers have found that their image in the eyes of their peers has improved. It is not unusual for a Project Schoolflight teacher to find that the program often serves as a springboard for additional responsibility as his or her abilities as an educator are recognized.

Q. How many schools participate in Project Schoolflight?

A. At this time, over 500 aircraft projects have been started in participating schools. More than 175 completions are a good measure of effectiveness of the program. Many schools have built more than one airplane.

Q. Do restorations of older airplanes in the classroom qualify as part of Project Schoolflight?

A. Yes. Some of the Project Schoolflight airplanes are restorations. The skill and the amount of work required in restoration is very similar to building an airplane from scratch.

Q. How do I select an airplane to build?

A. EAA's manual, "Sport Aircraft You Can Build" can give you specifications, photos, and sources for plans on over 200 different types of aircraft.

Q. Where do I obtain supplies and technical information?

A. EAA members receive SPORT AVIATION Magazine which has advertisements by many suppliers catering to the amateur-built airplane enthusiast. In addition, the many fine articles on building and flying various airplanes will be helpful. Information services at EAA Headquarters is just a phone call or letter away when you are in need of specific information. EAA also has a special offer on the acquisition of plans for the Acro Sport I, Acro Sport II and the Pober Pixie. Please contact the Schoolflight Director for further information.

Q. Is there someone close to my school who can help me with any problems I may have?

A. Yes. There is a network of EAA chapters all over the world. EAA chapter presidents can refer you to chapter designees. Designees are volunteers who have built their own airplanes. They can help with technical problems and are available to make volunteer inspections as you progress. (It is always

a good idea to have someone who is knowledgeable check your work.) Other volunteers, known as Schoolflight Tech Reps, help teachers and educators throughout the program.

Q. What is a Schoolflight Tech Rep?

A. This is an EAA member volunteer who is interested in promoting aviation education in his area. He freely gives of his time to promote aviation education through Project Schoolflight, teaching aviation ground school classes and advising a youth group.

Q. Does the Federal Aviation Administration support the program?

A. Yes. FAA has printed an Advisory Circular, No. AC 20-86, supporting Project Schoolflight. Local FAA offices are authorized to direct you to local chapters and suppliers. They will also make federally required pre-cover and pre-flight inspections on the airplane as required by Federal regulations.

Q. How do I obtain the information I need to get started?

A. The EAA Aviation Foundation publishes a variety of circulars and periodicals on Project Schoolflight. These include:

- Curriculum guides for school projects
- Film listings for aviation films for classroom use
- Scholarship information
- Manual listing - "how to" types for building information
- EAA Designee lists
- EAA chapter lists
- EAA manuals
- Schoolflight School Listing
- Schoolflight Tech Rep Listing
- Special plans offered to schools only
- Reference service through Project Schoolflight Director
- EAA publication, SPORT AVIATION, subscription rate: $10.00 to schools only

FOR FURTHER INFORMATION WRITE:

Executive Director
Project Schoolflight
EAA Aviation Foundation
P.O. Box 469
Hales Corners,
Wisconsin 53130

APPENDIX FIVE

CIVIL AIR PATROL
LIST OF AEROSPACE EDUCATION
WORKSHOPS

Civil Air Patrol's Center For Aerospace Education Development publishes an annual list of college, university and school system Aerospace Education Workshops. The current list is as of April 1983.

The listings are by Civil Air Patrol Regions of which there are nine in the United States. Typical listings include: state, name of the institution, name and mailing address of the workshop director, dates of the project and whether or not it is eligible for airlift.

It is suggested that FAA Aviation Education Facilitators, who know about plans for an aerospace education workshop, share the information with Civil Air Patrol for possible listing in their annual publication.

For a copy of the list or to provide information, write to:

Mr. Harold R. Bacon
Deputy Chief of Staff for
Aerospace Education
Director, Center for Aerospace
Education Development
Civil Air Patrol Headquarters
Maxwell Air Force Base
Alabama 36112

APPENDIX SIX

AIRWAY SCIENCE CURRICULUM
SUBJECT AREAS

AIRWAY SCIENCE CURRICULUM

Generic Curriculum Outline

Subject Areas

General Studies

To include written and oral communication, social and behavioral sciences, humanities and the arts.

Mathematics

Basic math courses to serve as foundations for computer science, science, and areas of concentration.

Science and Technology

To include physics, geography, chemistry and appropriate technology, and/or engineering courses.

Computer Science

To include basic applied computer science courses.

Management

To include general management courses.

Aviation

To include aviation safety, law, navigation, communication, flight, meteorology, history and operations.

Areas of Concentration

1) Airway Science Management
2) Airway Computer Science
3) Aircraft Systems Management
4) Airway Electronic Systems
5) Aviation Maintenance Management

APPENDIX SEVEN

AIRWAY SCIENCE CURRICULUM
SUBJECT AREA DETAILED DESCRIPTION

AIRWAY SCIENCE CURRICULUM

Subject Area Parameters

General Studies (27 Semester Hours)

Purpose: To provide the opportunity for the extension of basic learning and communication skills, development of intellectual curiosity, and assessment of a social and historical perspective necessary for a broadly based, "well-rounded" individual.

Course Content: Courses will be designed to teach the skills that have been called "the foundations" of education. Critical thinking, cognitive and analytical skills, artistic skills, and communication skills are typical areas to be offered to satisfy this section of the curriculum.

Sample Courses: Composition, Speech, Economics, Languages, Logic, Government and Technical Writing.

Mathematics (25 Semester Hours Math, Science and Technology Combined)

Purpose: To offer a mathematical background specifically directed toward managerial personnel functioning in a high technology environment, including the preparation necessary for an Area of Concentration in Airway Computer Science and in Airway Electronic Systems.

Course Content: Specific topics should include college level algebra, analytical geometry, trigonometric functions, exponential and logarithmic functions, vectors and vector notation, matrix theory and applications, functional notation, basic integration and differentiation, linear equations and inequalities, elementary probability and descriptive statistics and linear programming.

Sample Courses: Algebra, Calculus, Geometry, Trigonometry, Analytic Geometry, Statistics and Math Methods.

Science and Technology (See Above)

Purpose: To expose the student to those scientific disciplines which foster and develop logical and in-depth thought processes particularly pertinent for managers in such a fast developing and electronically evolving working environment.

Course Content: Specific topics should include areas in the physical sciences as well as general technology that would have application to the aviation industry.

Sample Courses: Physics, Chemistry, Physical Science, Geography, Meteorology, Introduction to Engineering, and Technology and Society.

Computer Science (9 Semester Hours)

Purpose: To provide the fundamental foundations required for a manager to understand, appreciate and effectively work with high technology personnel in a complex and dynamic computer oriented industry.

Course Content: Specific topics should include data processing, computer languages (their use and applications), data base management, micro and mini computers, computer security, office automation, societal impacts, graphic usage and simulation.

Sample Courses: Information Systems, Introduction to Computers, Micro Computers, Systems Analysis, Data Processing, Computer Science, Computer Programming, Computer and Society and Computer Architecture.

Management (9 Semester Hours)

Purpose: To provide an educational background in management related areas expressly directed toward understanding and interacting with the human and interpersonal relationships necessarily developed in such a diverse field as aviation.

Course Content: The student will be required to have a general understanding of basic management concerns including those topics dealing with organization, motivation and interpersonal relations. Curriculum is to include basic supervision concepts.

Sample Courses: Business Communications, Personnel Management, Principles of Management, Techniques of Supervision, Organizational Behavior and Administrative Problems.

Aviation (15 Semester Hours)

Purpose: This section of the curriculum will provide the student with a broad knowledge of aviation operations, the aviation industry, the problems of flight and aircraft systems, and the need to integrate these facets into a comprehensive understanding of the aviation community as a whole.

Course Content: Courses in this area are designed to create an awareness of the operational environment of flight and aircraft systems, as well as the problems of aviation as a dynamic and growth oriented industry.

Sample Courses: Aviation History, Navigation and Communication, Introduction to Aeronautics, Aviation Meteorology, Aviation Safety and Aerospace Legislation.

Areas of Concentration

I. Airway Science Management

Coursework in this area will prepare students specifically for a variety of administrative and management positions in the aviation community. It will be oriented to the technology of aviation through the core requirements of the curriculum.

Numerous career options exist both in industry and the Government in management areas related to aviation activities to include such positions as airport manager, general aviation operation manager, air carrier management and air traffic control.

II. Airway Computer Science

This program will consist of a series of computer science courses that will prepare the individual to function in diverse areas of computer operation, design, maintenance, troubleshooting and programming within the field of aviation.

Career options will continue to expand as flight, navigation, communication and information processing systems increasingly become computerized and automated. It is assumed that these graduates will be capable of assuming management and supervisory positions in time.

III. Aircraft Systems Management

This area of concentration focuses on aircraft flight operations and has as its major goal the preparation of persons with qualifications as professional pilots but who have a science/technology orientation.

The Program would include courses leading to at least commercial certification and instrument and multiengine ratings. In addition, students would take advanced work in Aerodynamics, Propulsion Systems, Aircraft Structures and Systems, and Aircraft Performance. The graduates will hold a current flight instructor certificate with airplane, instrument and multiengine ratings.

Graduates can expect to enter fields with the Government as aviation safety officers or operations pilots or in industry as professional pilots and/or flight operations managers.

IV. Airway Electronic Systems

This area of concentration will include a comprehensive study of the theories of electronics as well as practical experiences which would prepare the graduate to assume duties for a career in Government and general aviation electronics. They will be qualified to work not only in maintenance and troubleshooting, but also in supervision, management, testing and developmental work.

V. Aviation Maintenance Management

The area of concentration will include an in-depth coverage of the theoretical and practical aspects of airframe and powerplant maintenance. In addition to possessing the bachelor's degree, the graduates will hold a mechanics certificate with A and P ratings. They will be qualified to work not only in maintenance and trouble-shooting, but also in supervision and management.

GUIDELINES FOR A CURRICULUM IN AIRWAY SCIENCE

Core Sample Curriculum

Subject Areas		
General Studies		
English Composition	3	
Technical Writing	3	
Economics	6	
Government	3	
Psychology	3	
Humanities	3	
History	3	
Speech	3	
	27	
Math/Science/Technology		
Algebra/Trigonometry	3	
Calculus	3	
Physics	8	
Geography	4	
Statistics	3	
Chemistry	4	
	25	
Computer Science		
Introduction to the Computer	3	
Computer Programming I	3	
Computer Science Elective	3	
	9	
Management		
Principles of Management	3	
Organizational Behavior	3	
Techniques of Supervision	3	
	9	
Aviation		
Introduction to Aeronautics or Private Pilot Certification	3	
Aviation Legislation	3	
Flight Safety	3	
Air Traffic Control	3	
The National Airspace System	3	
	15	
Areas of Concentration	40	
Students will choose one area (see following table for Areas of Concentration sample curriculums)		Total 125

Areas of Concentration/Sample Curriculums

I. Airway Science Management

Introduction to Sociology	3
Theories of Personality	3
Psychology of Communication	3
Intro to Interpersonal Communication	3
Communication Theory and Models	3
Introduction to Administrative Problems	3
Air Transportation	3
Airport Management	3
Theories of Personnel Management	3
Concepts of Air Transport Utilization	3
Labor/Management Relations	3
Operations Management	2
Management Decisionmaking	2
Approved Electives	3
	40

II. Airway Computer Science

Computer Programming II	3
Advanced Computer Programming	3
Computer Operating Systems	3
Assembler Language Programming	3
Data Structures	3
Computer Methods and Applications I	3
Computer Methods and Applications II	3
Introduction to Microcomputers	3
Introduction to Office Automation	3
Theory of Programming Languages and Complex Construction	3
Mathematical Modeling and Computer Simulation	4
Computer Architecture	3
Approved Electives	3
	40

III. Aircraft Systems Management

Commercial Pilot Certification	5
Instrument Rating	5
Multi-Rating	1
CFI-Airplane	5
CFI-Instruments	3
Advanced Aerodynamics and Aircraft Performance	3
Advanced Aircraft Systems	3
Meteorology	3
Weather Reporting and Analysis	3
Aviation Management	3
Air Transportation	3
XFI-Multiengine	3
	40

These graduates must hold a Flight Instructor Certificate with Airplane, Instrument and Multiengine ratings.

IV. Airway Electronics Systems

Theory of Electronics	3
Calculus II	3
Math Analysis	3
Microprocessor Theory and Application	3
Advanced Computer Programming	3
Solid State Devices	3
Integrated Circuits	3
Engineering Drawing	2
Electrical Circuits	3
Digital Logic Application	3
Advanced Logic Analysis	3
Reliability and Maintainability Theory and Systems Engineering	3
Electrical and Power Principles	2
Approved Electives	3
	40

V. Aviation Maintenance Management

Engineering Drawing	2
Aircraft Materials	2
Propulsion	6
Propulsion Laboratory	6
Structures	6
Structures Laboratory	6
Aircraft Systems	3
Avionics Systems	3
Reliability and Maintainability Theory and Systems Engineering	3
Approved Electives	3
	40

These graduates must hold the Airframe and Powerplant Technicians Ratings (Mechanics).

APPENDIX EIGHT

CALIFORNIA GOVERNOR'S TASK FORCE RECOMMENDATIONS

SUMMARY OF TASK FORCE RECOMMENDATIONS

1. Currently available written materials should be reproduced and made available to all school districts. This reproduction should be on a selective basis, choosing the best available materials.

2. It is essential that the sections in the Education Code which deal with Aerospace-Aviation Education be fully implemented.

3. On the basis of knowledge about aviation and the uses of aviation to motivate students, potential teachers in teacher-training institutions should be afforded an orientation in aviation and aerospace.

4. Teachers currently in service should be afforded workshops and training sessions, properly organized and financed by State agencies.

5. A program of insurance for schools and colleges for liability coverage when providing educational flight experience to pupils should be established.

6. Those teachers who are currently licensed pilots should be encouraged to use aviation in their classroom situations.

7. Maintain close cooperation and liaison between the schools and aerospace industry so that the information and concepts taught in the schools are in line with current and projected industry goals and needs.

8. Establish a priority for the development of a low-cost, manipulative flight simulator for use in those schools where there has been encountered a lack of parental acceptance of flight experience for pupils.

9. Encourage and maximize cooperation with private, fixed-base operators and flight training centers. Utilize their facilities and personnel whenever possible in the flight instruction, cross-country and airframe powerplant maintenance categories of instruction.

10. Encourage school districts to work with interested aviation bodies or groups in their community. Bring into the classrooms local speakers who are knowledgeable about aviation and aerospace. Some sources of expertise are: Local Fixed Base Operators, Flight Schools, the Federal Aviation Administration,the California Department of Aeronautics, the Aircraft Owners and Pilots' Association (AOPA), the Airline Pilots' Association (ALPA), the Air Transport Association (ATA), the Flying Physicians, the Flying Farmers, the Ninety-Nines, the Civil Air Patrol, etc.

11. Establish, and appropriately fund, a position within the California Department of Aeronautics, to advise on and coordinate the aerospace-aviation activities of the various educational entities throughout the State.

12. Establish four-year aerospace-aviation courses at more of the State colleges, to encompass business, science, airframe and powerplant technology, flight, etc.

13. Standardize curricula. (Until majors are offered in aeronautics or aviation at more of the State's colleges, it is difficult for the community colleges to standardize their curricula. Once standardization is accomplished, the problem of transfer credits, in other words, articulation, will be eliminated).

14. Encourage industry to offer incentives to students entering upon programs to fill the needs of industry.

15. In the State's Schools of Medicine, place more emphasis on aviation medicine. In high schools and in other colleges, utilize aviation medicine concepts to stimulate students in a host of health-related areas.

16. Provide funding to facilitate further research and exploration into the possible advantages of incorporating aviation programs in the school curricula, to captivate and retain potential school dropouts and the under-achievers.

17. State College Trustees should be urged to encourage the incorporation of flight activities appropriate to the curriculum. Provide a correct interpretation of the Executive Order on student air travel. (This order is frequently and incorrectly interpreted as imposing sanctions against student flight activities).

18. For the elementary, junior high school and high school levels, we recommend that aviation education be incorporated into the curricula of the State's schools; that this concept be endorsed by the State School Board; and that appropriate text books be selected for each educational level.

19. Organize and establish teacher-oriented programs, either as workshops, or as classroom activities, so designed as to facilitate the uses of aerospace-aviation in imparting a broad spectrum of traditional knowledge (and not specifically restricted to vocational orientation) to the student. Exercise due care to avoid concentrating solely on the science aspects; rather, keep the programs as comprehensive as is practicable.

20. Offer continuing education, counseling, and/or retraining at the State's colleges and universities for present employees in the aerospace-aviation industry. Offer support, encouragement and coordination on a statewide basis.

21. Develop all possible sources of funding so that laboratory programs can continue to be adequately supported. Assist the Colleges and Universities financially in the maintenance of equipment, or in the replacement of those units which are obsolescent.

22. Encourage the colleges and universities to develop new programs in aviation and transportation, multi-modal in their approach, and multi-disciplinary in design.

Referring to recommendation 8, above, the Task Force strongly encourages the use of unsophisticated flight simulators in the elementary schools, and the commercially developed, more sophisticated flight simulators for high schools, community colleges, universities, and in adult education aviation programs.

APPENDIX NINE

EASTERN REGION
AVIATION EDUCATION FACILITATOR
ACTIVITY REPORT

EASTERN REGION

AVIATION EDUCATION ACTIVITY REPORT

PERIOD: 2ND Quarter CY-83 Apr-May-June, 1983

AREA FACILITATOR: John Doe, ABC ATCT

LOCATION: Alphaville, PA

DATE: July 1, 1983

DATE	NAME, FOF	TYPE ACTIVITY	ORGANIZATION/LOCATIONS	GROUP SIZE	HOURS	
					DUTY	OFF-DUTY
4/9/83	John Doe, ABC ATCT	Career Day	Alphaville, PA H.S.	1200	4	2
4/12/83	John Brown, ABC GADO	Guest Speaker	Alphaville Chamber of Commerce	125	1	4
4/27/83	Joan Jones, ABC ARTCC	Facility Tours (3)	XYZ Elementary School, 6th & 7th grades, DEF Jr. H.S. 9th Grade	68 112	1 2	0 0
5/4/83	Ed Edwards ABC GADO	Teacher Seminar/ Workshop	Local Girl Scout Troop 7 local H.S. Guidance Depts.	45 32	1 2	0 4
5/9/83	Sally Smith, ABC ATCT	Classroom Speaker	Challenger H.S., Principles of Flight	200	4	0
5/17/83	Fred Fredericks, ABC FSS	Facility Tour & Lectures	Alphaville University, Aviation Sciences Classes	110	3	0
5/25/83	Joan Jones, ABC ARTCC	Classroom Speaker	DEF Junior H.S.	85	0	4
6/4/83	A. Andrews, ABC ADO	Guest Speaker/ Seminar, Airport Development	Airport users/airline & general aviation/local planning boards/ civic groups-Alphaville Airport	150	2	6

EA FORM _____

APPENDIX TEN

SUGGESTED ONE-DAY AVIATION EDUCATION FACILITATOR WORKSHOP

SUGGESTED ONE-DAY

AVIATION EDUCATION FACILITATOR WORKSHOP

(Place)
(Date)

0800-0815	COFFEE, REGISTRATION
0815-0840	GREETINGS - Regional Director or Facility Chief State Official - either in education or aviation Local Educator
0840-0900	WORKSHOP OBJECTIVES AND PLAN
0900-0930	ROLES AND RESPONSIBILITIES OF AVIATION EDUCATION FACILITATORS
0930-1000	FAA AVIATION EDUCATION MATERIALS AND RESOURCES
1000-1015	BREAK
1015-1115	BRIEF DESCRIPTION OF EDUCATIONAL PROGRAMS Elementary - Educator Secondary - Educator College or University - Educator
1115-1145	QUESTIONS AND ANSWERS
1145-1200	SUMMARY OF MORNING SESSION
1200-1300	LUNCH
1300-1430	AVIATION-AEROSPACE EDUCATION RESOURCES NASA Aviation Industry CAP Publishers EAA Local, State Officials
1430-1500	CAREERS IN AVIATION (Outlook on prospects for government, industry and education employment)
1500-1515	BREAK
1515-1600	SIMULATION EXERCISE (Participants perform a variety of roles as an Aviation Education Facilitator. The group then discusses strong and weak points of what has been observed.)
1600-1630	FACILITATOR PLANNING SESSION (Here participants discuss how they plan to use materials, resources and experiences of the Workshop in their own situations. Additional needs are identified, plans for staying in communication and forming a Facilitator network are discussed.)
1630-1700	QUESTIONS AND ANSWERS, SUMMARY OF AFTERNOON SESSION, EVALUATION.

APPENDIX ELEVEN

SUGGESTED TWO-DAY AND THREE-DAY AVIATION EDUCATION FACILITATOR WORKSHOPS

SUGGESTED TWO-DAY

AVIATION EDUCATION FACILITATOR WORKSHOP

(Place)
(Dates)

FIRST DAY

0800-0830	COFFEE, REGISTRATION
0830-0900	GREETINGS - Regional Director or Facility Manager State Officials - Education and Aviation
0900-0915	WORKSHOP SCHEDULE AND OBJECTIVES
0915-0930	FAA AVIATION EDUCATION POLICY
0930-1000	ROLES AND RESPONSIBILITIES OF AVIATION EDUCATION FACILITATORS
1000-1015	BREAK
1015-1100	EXAMINATION AND EXPLANATION OF FAA AVIATION EDUCATION MATERIALS
1100-1200	STATE LEVEL REPRESENTATIVES, EDUCATION AND AVIATION Describe their mutual interests with FAA in Aviation Education programs, projects or activities in the state.
1200-1300	LUNCH
1300-1345	CAREERS IN AVIATION Describe job outlook in area in terms of government, industry and education. Suggest use of two people.
1345-1515	ELEMENTARY EDUCATION MINI-SESSION - Note: Same as sessions described in three-day plan except this one suggests three groups - 25 minutes each. Group I - Elementary Education - tips from an experienced teacher. Group II- Simple Science Demonstrations - using FAA Demonstration Aids materials. Group III- Paper Model Airplane contest
1515-1530	BREAK
1530-1630	ELEMENTARY EDUCATION NEEDS Use a principal or teacher or combination to discuss the ways elementary educators make use of resource personnel like FAA Aviation Education Facilitators.
1630-1700	SUMMARY AND EVALUATION OF FIRST DAY

SECOND DAY

0800-0845 SECONDARY EDUCATION ISSUES
Use a high school Administrator or Director of Curriculum or other suitable professional. Bring out ways in which FAA Aviation Education Facilitators may be of help.

0845-0945 COLLEGE AND UNIVERSITY PROGRAMS
Use appropriate higher education officials to discuss trends and describe their needs for using FAA resource persons. Include a presentation and discussion of the FAA Airway Science Curriculum.

0945-1000 BREAK

1000-1215 SECONDARY EDUCATION MINI-SESSIONS - Note: These are forty minute sessions done concurrently and repeated three times so each group takes part in each of them.

Group I - Aviation Education Research - discussion of data from projects such as the Richmond, California Study, August Martin High School and EAA's Schoolflight Program describing validated benefits of such programs.

Group II - Building the Delta Dart - giving each participant a "hands-on" experience.

Group III - Airport Simulation - using role playing, have each participant play an appropriate role for locating or expanding a major airport. Allow time to have each person play at least two roles - preferably on opposite points of view.

1215-1315 LUNCH

1315-1415 BUILDING AN AIRCRAFT IN SCHOOL
Presented by a representative of the Experimental Aircraft Association (EAA).

1415-1515 AVIATION-AEROSPACE EDUCATION RESOURCES

FAA	Aviation Industry	NASA
CAP	Publishers	

1515-1530 BREAK

1530-1630 AVIATION EDUCATION FACILITATORS SIMULATION
Using role playing techniques, demonstrate how facilitators handle a variety of approaches to educators - elementary, secondary and higher education - and to fellow FAA employees.

1630-1700 SUMMARY, APPRECIATION FOR SUPPORT, CERTIFICATES AND EVALUATION OF SECOND DAY AND ENTIRE WORKSHOP.

SUGGESTED THREE-DAY

AVIATION EDUCATION FACILITATOR WORKSHOP

(Place)
(Dates)

FIRST DAY

0800-0830	COFFEE, REGISTRATION
0830-0900	GREETINGS - Regional Director or Facility Manager State Officials - Education and Aviation
0900-0915	WORKSHOP OVERVIEW Review, explain schedule, discuss workshop objectives
0915-0945	ROLES AND RESPONSIBILITIES OF AVIATION EDUCATION FACILITATORS
0945-1015	EXPLANATION OF AVAILABLE FAA AVIATION EDUCATION MATERIALS
1015-1030	BREAK
1030-1130	PARTICIPANTS BRIEFLY DESCRIBE THEIR PREVIOUS AVIATION EDUCATION EXPERIENCES
1130-1200	REPRESENTATIVE OF STATE LEVEL OF EDUCATION Describes interests, programs, needs FAA might serve
1200-1300	LUNCH
1300-1330	REPRESENTATIVE OF STATE LEVEL AVIATION Describes interests in aviation education
1330-1530	ELEMENTARY EDUCATION MINI-SESSIONS - Note: These are four concurrent sessions designed for small groups (one fourth of total workshop group in each one). Each session is repeated four times and should last 25 minutes, allowing five minutes to change groups. Group I - Elementary Education - tips from an experienced teacher. Group II - Career Awareness - by a guidance counselor Group III - Simple Science Demonstration - using FAA Demonstration Aids materials. Group IV - Paper Model Airplane Contest
1530-1545	BREAK
1545-1630	GROUP DISCUSSION OF HOW TO USE EXPERIENCES GAINED THUS FAR
1630-1700	SUMMARY OF HIGHLIGHTS OF THE DAY AND FIRST DAY EVALUATION

SECOND DAY

0800-0845 SECONDARY EDUCATION ISSUES AND CHALLENGES
Use a high school Administrator, Director of Curriculum or other suitable professional.

0845-0945 BUILDING AN AIRCRAFT IN SCHOOL
Presented by a representative of the Experimental Aircraft Association (EAA).

0945-1000 BREAK

1000-1100 HIGH SCHOOL EDUCATOR RESOURCE PANEL
Using three or four high school educators (including those on the program earlier) discuss and answer questions as to how FAA personnel can be helpful to schools in attaining mutual objectives.

1100-1200 AVIATION EDUCATION MATERIALS OF INSTRUCTION FOR HIGH SCHOOLS
Demonstrate and describe various teaching materials useful in high schools - texts, audio-visual materials, etc.

1200-1300 LUNCH

1300-1600 SECONDARY EDUCATION MINI-SESSIONS - Note: These are small group sessions done concurrently and repeated so each group rotates to each session. Each session should be repeated four times and last 40 minutes.

Group I - Aviation Education Research - discussion of data from projects such as the Richmond, California study, August Martin High School and EAA's Schoolflight Program, describing validated benefits of such programs.

Group II - Building the Delta Dart - giving each participant a "hands-on" experience.

Group III - Airport Simulation - using role playing, have each participant play an appropriate role for locating or expanding a major airport. Try to allow time for each person to play two roles. If possible, try to have the two roles with one pro and the other con.

Group IV - High School Aviation Education Materials - use representatives of an aviation company, Civil Air Patrol, Jeppeson Sanderson Co., Aero Products Research or an experienced FAA staff member.

1600-1630 SUMMARY OF HIGH SCHOOL AVIATION EDUCATION RESOURCES AVAILABLE

1630-1700 QUESTIONS AND ANSWERS, EVALUATION OF SECOND DAY

THIRD DAY

0800-0830	COLLEGE AND UNIVERSITY OVERVIEW Use a local higher education official - President, Dean or Department or Division Head. Provide overall higher education trends and describe their and the local area situation.
0830-0930	PANEL OF COLLEGE AND UNIVERSITY STAFF Provide insights into what colleges and universities can do via formal courses as well as adult and continuation non-credit programs. Share information as to what higher education institutions want and need from sources such as FAA.
0930-1015	FAA AIRWAY SCIENCE CURRICULUM PROJECT Use an appropriate FAA staff person and a local college or university representative with such a program if applicable in the area.
1015-1030	BREAK
1030-1200	AVIATION EDUCATION FACILITATORS SIMULATION Using role playing techniques, demonstrate how facilitators would handle a variety of approaches to educators - elementary, secondary and higher education - and with fellow FAA employees.
1200-1300	LUNCH
1300-1430	AVIATION EDUCATION RESOURCE PANEL Use three to five educators, industry and government representatives to review techniques for resource sharing and attaining mutual aviation education goals.
1430-1530	AVIATION EDUCATION FACILITATOR INDIVIDUAL PLANNING SESSION - Ask each participant to outline how he/she plans to use the experiences gained in the workshop. Have staff people available for individual consultation as needed. Each participant writes his/her own plan.
1530-1545	BREAK
1545-1630	FACILITATORS SHARE PLANS Ask for volunteers from participants to briefly (2-3 minutes each) share with the group what they plan to do as follow-up to the workshop.
1630-1700	SUMMARY, APPRECIATION FOR SUPPORT, CERTIFICATES AND EVALUATION OF THIRD DAY AND ENTIRE WORKSHOP.

APPENDIX TWELVE

FAA - CAP - NASA
AVIATION-AEROSPACE EDUCATION
REGIONAL OFFICES

AVIATION-AEROSPACE EDUCATION REGIONAL-FIELD OFFICES

Federal Aviation Administration Regional
Aviation Education Coordinators

Civil Air Patrol Regional Directors of
Aerospace Education

National Aeronautics and Space Administration
Educational Program Officers

FAA, CAP and NASA have the largest number of personnel assigned in field and facility offices with responsibility for providing services and resources to the educational systems of the nation. In each case, staff members are assigned certain states within regional boundaries they serve. Each of the three organizations have slightly different allocation of states in their respective regions.

FEDERAL AVIATION ADMINISTRATION

REGIONAL AVIATION EDUCATION COORDINATORS

Mike Ciccarelli, ANE-5
New England Region
12 New England Executive Park
Burlington, Mass. 01803
8-836-1391 FTS
(617) 273-7391

Donald Heiman, ACE-700
Central Region
601 East 12th Street
Federal Building, Room 1545
Kansas City, MO 64106
8-758-3901 FTS
(816) 374-5811

Paul Kari, ANM-5
Northwest Mountain Region
17900 Pacific Highway South
C-68966
Seattle, WA 98168
8-446-2005 FTS
(206) 431-2017

George Briskey, AEA-4
Eastern Region
JFK International Airport
Federal Building
Jamaica, NY 11430
8-667-1019 FTS
(212) 917-1019

Barbara Abels, AWP-5
Western-Pacific Region
15000 Aviation Boulevard
Hawthorne, CA
(Mail Address: P.O. Box 92007)
Worldway Postal Center
Los Angeles, CA 90009
8-966-6431 FTS
(213) 536-6431

Hector Colon, AGL-17
Great Lakes Region
O'Hare Lake Office Center
2300 East Devon Avenue
Des Plaines, IL 60018
8-384-7372 FTS
(312) 694-7727

Henry Christiansen, ASW-1B
Southwest Region
4400 Blue Mound Road
(Mail Address: P.O. Box 1689)
Fort Worth, Texas 76101
8-734-2125
(817) 877-2087

Harlon J. Thal, ACT-8A
FAA Tec-nical Center
Atlantic City Airport
Atlantic City, NJ 08405
8-346-2222 FTS
(609) 641-8200

Jack Barker, ASO-5
Southern Region
3400 Norman Berry Drive
East Point, GA
(Mail Address: P.O. Box 20636)
Atlanta, GA 30320
8-246-7201 FTS
(404) 763-7201

Ivy Moore, AAL-5A
Alaskan Region
701 C Street, Box 14
Anchorage, AK 99513
8-907-5293

CIVIL AIR PATROL

DIRECTORS OF AEROSPACE EDUCATION

Mr. Harold R. Bacon
Deputy Chief of Staff for Aerospace Education
Civil Air Patrol National Headquarters
Maxwell AFB, Montgomery, AL 36112
(205) 293-5371/5387

Mr. Robert C. Smith
Director of Aerospace Education
Northeast Region
USAF-CAP NELR
Building 29-01
McGuire AFB, NJ 08641
(609) 724-2967/2931

(ME,NH,VT,Mass, RI,
Conn, NY,PA,NJ)

Mr. Walter H. Flint
Director of Aerospace Education
Middle East Region
USAF-CAP MELR
Building 3755 Stop 45
Andrews AFB, MD 20331
(301) 981-6229/5273

(Del, MD,VA,WV,NC,SC)

Mr. Phillip Woodruff
Director of Aerospace Education
Great Lakes Region
USAF-CAP GLLR
(MCLGLR)
Wright-Patterson AFB, OH 45433
(513) 257-6836

(Wis, Mich, ILL, Ind, OH, KY)

Mr. Kenneth C. Perkins
Director of Aerospace Education
Southeast Region
USAF-CAP SELR
Building 802
Dobbins AFB, GA 30060
(404) 429-5266

(Tenn, Miss, Ala, GA, Fla, PR)

Mr. Melvin A. Ziehl
Director of Aerospace Education
North Central Region
USAF-CAP NCLR
Building 852
Minneapolis-St. Paul Int. Airport
Minneapolis, MN 55450
(612) 725-5361

(Minn, N.D., S.D., Nebr, Kan,
Mo, Iowa)

Mr. C.E. Neal
Director of Aerospace Education
Southwest Region
USAF-CAP SWLR
USNAS
Dallas, Texas 75211
(214) 264-2353

(Tx, LA, Ark, Okla, NM, Ariz)

Mr. Noel A. Bullock
Director of Aerospace Education
Rocky Mountain Region
USAF-CAP RMLR
BUilding 407
Lowry AFB, CO 80230
(303) 370-3075/3082

(Co, Wyo, Mont, Idaho, Utah)

Ms. Jule Zumwalt
Director of Aerospace Education
Pacific Region
USAF-CAP PLR
Building 3338
Mather AFB, CA 95655
(916) 364-2554/4550

(CA, Nev, ORE, Wash, Alaska,
Hawaii)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
EDUCATIONAL PROGRAMS OFFICERS

National Headquarters:

Dr. Curtis M. Graves
Chief, Educational Services Branch
NASA-LFC-6
Washington, D.C. 20546
(202) 755-0816

Mr. William D. Nixon
Ass't. Chief, Educational Svcs. Br.
NASA-LFC-6
Washington, D.C. 20546
(202) 755-3756

Mr. Elva Bailey
Educational Programs Officer
NASA Goddard Space Flight Center
Greenbelt, MD 20771
(301) 344-7207

(ME, NH, VT, RI, CONN, MASS, NY, PA, NJ, DEL, MD)

Mr. Jimmy R. Pruitt
Educational Programs Officer
NASA Marshall Space Flight Center
Marshall Space Flight Center, AL 35812
(205) 453-0038

(LA, MISS, AL, TENN, ARK, MO, IOWA)

Mr. Roger Hathaway
Educational Programs Officer
NASA Langley Research Center
Hampton, VA 23665
(804) 827-4358

(VA, WV, NC, SC)

Mr. James D. Poindexter
Educational Programs Officer
NASA Johnson Space Center
Houston, TX 77058
(713) 483-4241

(TX, OKLA, N.MEX, COL, KAN, NEB, S. DAK, N. DAK)

Mr. R. Lynn Bondurant
Educational Programs Officer
NASA Lewis Research Center
2100 Brookpark Road
Cleveland, OH 44135
(216) 433-4000, Ext. 444/708

(OH, IND, ILL, MICH, WIS, MINN)

Mr. Michael Donahoe
Education Programs Officer
(Southern Region, west)
NASA Ames Research Center
Moffett Field, CA 94035
(415) 965-5544

(So.CA, ARIZ, NEV, UTAH)

Mr. Raymond R. Corey
Educational Programs Officer
NASA Kennedy Space Center
Kennedy Space Center, FL 32899
(306) 867-4444

(Fla, GA)

Mr. Garth A. Hull
Educational Programs Officer
(Northern region, west)
NASA Ames Research Center
Moffett Field, CA 94035
(415) 965-5543

(No.CA, ORE, WASH, IDAHO, MONT, WYO)

Philipp D. Neuhauser
Manager, Audiovisual and Education Office
NASA Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91103
(213) 354-2423

BIBLIOGRAPHY

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